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CHOGHA MARAN: A LOCAL CENTER OF THE CHALCOLITHIC AND EARLY BRONZE AGE IN THE CENTRAL ZAGROS

BY

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Abstract: Between 1975-78, L.D. Levine and his team conducted the largest survey project in the Zagros Mountains – the Mahidasht Survey Project – focusing on four contiguous plains in Kermanshah Province that straddled the major route between Mesopotamia and the Iranian highlands. Four weeks of excavations at the site of Chogha Maran documented a sequence of settlements of the fifth and third millennia BCE. The results from these excavations form to this day the only stratified dataset for these periods in the western central Zagros. The Chalcolithic and Early Bronze Age pottery and administrative artifacts from Chogha Maran reveal distinctly local traditions that differ significantly from the contemporary settlement at Godin Tepe in the Kangavar Plain. This article presents the stratigraphy and artifacts from Chogha Maran based on archival research at the Royal Ontario Museum in Toronto and a reanalysis of a large corpus of clay sealings and tokens at the National Museum of Iran in Tehran. Our analysis of this material traces the emergence of small-scale, yet complex societies in the central Zagros, which were fully integrated in the highland-lowland interaction networks while maintaining distinctly local cultural traditions expressed most clearly in potting practices and glyptic imagery.

Keywords: Zagros; Mahidasht; Chogha Maran; Chalcolithic; Early Bronze Age

Introduction

The Kermanshah region encompasses the largest area of plains within the Zagros Mountains, providing well-drained agricultural lands, plenty of fresh water sources, and immediate access to highland resources. The

* This article is largely based on S. Renette's archival research at the Royal Ontario Museum as part of his 2018 Ph.D. dissertation. The section on the administrative artifacts is the result of A. Khayani's study of these materials at the National Museum of Iran, including the production of new photographs and drawings. L.D. Levine initiated and directed the Mahidasht Survey Project in 1975-78.

easiest route through the Zagros Mountains, connecting Mesopotamia with the Iranian Plateau and beyond, passes via Sar Pol-e Zohab, opens up into the Kermanshah plains and from there continues on to Hamadan, passing the Achaemenid rock relief of Bisitun midway (Fig. 1). Despite its importance to reconstruct the history of Zagros mountain societies, this western stretch of the so-called Khorasan Road (or High Road) has been poorly represented in archaeological narratives of the Bronze Age when the exchange network that encompassed Mesopotamia and the eastern highlands truly developed – i.e. the Age of Exchange (Amiet 1986; 1993; Lamberg-Karlovsky 2013; Possehl 2002: 215-236; 2007; Potts 1994; Potts 2015; Ratnagar 2004). The results from excavations at Godin Tepe further east on this High Road in the Kangavar Plain have become rightfully famous (Gopnik & Rothman 2011), but these are not representative for the entire central Zagros. The Kangavar and Kermanshah regions had very different ceramic traditions during the Early Chalcolithic with Dalma ceramics in Kangavar and 'Ubaid-related Black-on-Buff Siahbid ware in Kermanshah (Henrickson 1985; 1986; 1989), and again during the Early Bronze Age when the Kura-Araxes tradition spread southward from the Lake Urmia region to Hamadan and extending westward into Kangavar but did not extend further west beyond the Kuh-i Garin (Rothman 2011). The only major exploration of the plains in Kermanshah, the Mahidasht Survey Project, aimed to address this gap in our knowledge by documenting a full settlement history (Levine 1975; 1976a; 1976b). Unfortunately, results from this project have remained unpublished and therefore underused in archaeological scholarship.[1] This article offers an extensive report of three soundings at Chogha Maran, conducted as part of the survey project, which produced the only substantial stratified evidence to date for the Chalcolithic (fifth millennium BCE) and Early Bronze Age (EBA; ca. 3000-2500 BCE) of the western central Zagros, complementing the Godin sequence.[2]

The Mahidasht Survey Project, initiated and led by L.D. Levine of the Royal Ontario Museum, was conducted during the spring and summer of 1975 and again during those seasons in 1978 in Kermanshah province in

[1] Summaries of the Neolithic and Chalcolithic ceramic assemblages documented by the Mahidasht Survey Project appeared in Henrickson 1985; Levine & McDonald 1977; Levine & Young 1987.

[2] A summary of the work at Chogha Maran and Tepe Siahbid, especially the evidence for the Chalcolithic period, can be found in Henrickson 1983: 305-429. The Bronze Age pottery from Chogha Maran was briefly discussed in Henrickson 1984: 708, Figs. 168-170 and 763-766, and in Levine & Young 1987: 48-50.

three contiguous plains: the Kermanshah, Kuzaran, and Mahidasht plains (Pl. 1).[3] This region is transected by four rivers and their tributaries: the Qara Su, the Abi-Marik (or Mereg), the lower Razavar, and the lower Gamas Ab (Levine 1976b: 160; Manhoubi 2012). The first visits by foreign archaeologists were undertaken by Aurel Stein and Erich Schmidt.[4] In 1959-1960, Robert Braidwood undertook the first systematic survey in the region, although only on a small scale and with a focus on the earliest origins of the Neolithic period. During this survey project, he also conducted small excavations at several sites, including the unpublished Late Chalcolithic site Dehsavar (Braidwood 1960a; 1961; Levine & McDonald 1977: 39; Pollock et al. 2020).

The Mahidasht Survey Project in 1975 and 1978 was an offshoot of the extensive work at Godin Tepe and the Kangavar region, with several of the same people involved, in order to extend the results westward along the major Khorasan route through the Zagros.[5] The survey region covered approximately 4000 square kilometers, of which ca. 40% was intensively surveyed in north-south and east-west transects (Levine 1975: 487; 1976a: 160) (Pl. 2). During 1975, the survey identified a total of 550 sites spanning the earliest Neolithic to the recent history. In 1978, the survey revisited some areas and explored additional segments, adding another 394 sites, most of which were small surface scatters dated by potsherds to the most recent 1500 years, while also excavating small soundings at five sites targeting the Chalcolithic and Iron Age periods. The 1975 survey has been discussed in two very brief preliminary reports and referenced in a few publications (Levine 1975; 1976a; 1976b; Levine & McDonald 1977). E. Henrickson used data from the excavations in 1978 for her dissertation research (Henrickson 1983; 1985), but the survey results of that year have never been discussed in print. The original survey and excavation records are stored at the Royal Ontario Museum in Toronto. However, while the survey records of 1975 appear to be largely complete, the records from 1978 lack a map detailing the location of the sites as well as the pottery

[3] A recent Iranian survey of the fourth, neighboring Sarfirouzabad plain complements the coverage of this region: Mirghaderi 2013; Niknami & Askarpour 2015; Niknami & Mirghaderi 2019; Niknami et al. 2016.

[4] Manhoubi 2012, which provides a complete overview of the history of archaeological exploration of the Mahidasht region.

[5] The survey project documented the full range of human occupation in these plains, but their main focus was the Chalcolithic and Iron Age. As a result, a chronological bias in the documentation remains with underrepresentation of the Bronze Age.

records. Since the team had to leave Iran in a hurry due to the developing political unrest in the country at the time, it is possible that these records were left at the National Museum in Tehran where the survey ceramics and excavated materials are currently being catalogued (Renette, Mohammadi Ghasrian & Ghafoori, in press).

Chogha Maran (Pl. 3) was one of three sites excavated in 1978 that contained Bronze Age occupation. At the other two sites, Tepe Gakieh and Tepe Siahbid, Bronze Age remains were poorly preserved in the soundings, so they will not be discussed here. Furthermore, the Bronze Age occupation at those sites is of a later date with a change in material culture, including the adoption of the Godin III monochrome painted ceramic tradition. In contrast, the sounding at Chogha Maran revealed a substantial occupation in the upper two meters of the mound that can be dated to the first half of the third millennium BCE, a period that is still poorly documented. The site's ceramic sequence and a substantial corpus of clay sealings with seal impressions are at present unique for the Zagros region. Together, they form a crucial dataset for understanding the nature of the Early Bronze Age society of the Zagros Mountains.

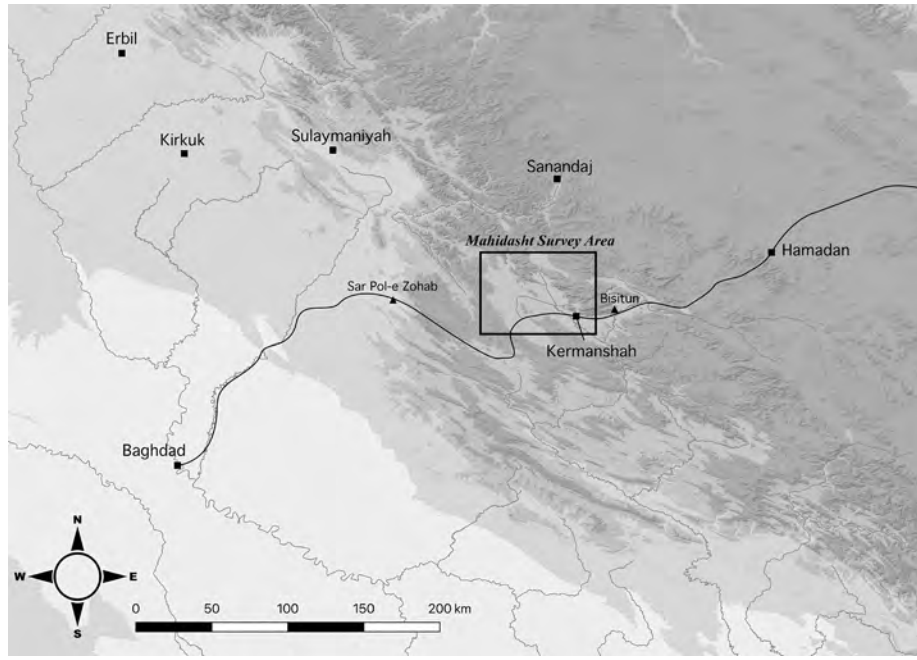

Fig. 1. Map of the Zagros with location of the High Road and the Mahidasht Survey area (map by S. Renette).

1. The Chalcolithic and Bronze Age of the Central Zagros

The history of archaeological exploration of the central Zagros Mountains and the main archaeological datasets have been extensively documented (Hassanzadeh & Miri 2012; Hole 1987; Moghaddam & Javanmardzadeh 2013; Potts 2013; Voigt & Dyson 1992) (Fig. 2). The first systematic excavations in the region, at Tepe Giyan (1931-32: Contenau & Ghirshman 1935) and in the Rumishgan area (1934-38: Schmidt et al. 1989), aimed to establish a chronological and cultural framework for the Luristan bronzes that were flooding the antiquities market. During the 1960s and 1970s, several international teams turned their attention to the central Zagros, mapping much of the region with extensive surveys (see Potts 2013: 205-206 for an overview with bibliography). Excavations during this time targeted mainly Neolithic sites, especially Tepe Guran (1963: Mortensen 2014; Thrane 2001), Ganj Dareh (1967-74: Smith 1976; 1978), and several soundings by the Iranian Prehistoric Project (1959-60: Braidwood 1960a; 1960b; 1961; Braidwood et al. 1961). The only excavated Bronze Age settlement remains, with the notable exception of Godin Tepe, were explored in a deep sounding at Baba Jan, dated to the last

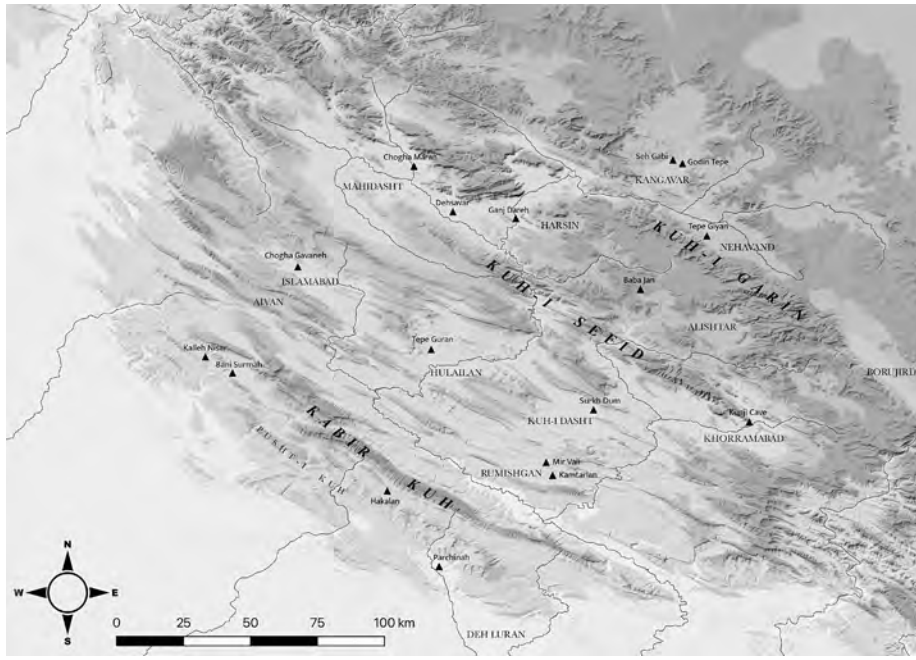

Fig. 2. Map of the Central Zagros region (provinces of Kermanshah, Ilam, and Luristan) with main regions and excavated sites (map by S. Renette).

quarter of the third millennium BCE, where excavations otherwise largely focused on the Iron Age levels (1966-69: Goff 1968; 1969; 1970; 1971; 1976; 1977; 1978; 1985). Otherwise, evidence for the Chalcolithic and Bronze Age, other than surface sherds collected during surveys, came almost exclusively from the excavations of cemetery sites, mainly by the Belgian team in the Pusht-i Kuh (1965-79: for the series of final reports, see Haerinck & Overlaet 1996; 1999; 2002; 2003; 2004; 2006; 2008; 2010; for a comprehensive bibliography of earlier reports see Potts 2013: 205).

At the eastern end of the central Zagros, in the Kangavar Valley, the Godin Project of the Royal Ontario Museum collected the most detailed archaeological sequence spanning from the Neolithic to the Iron Age with excavations at Seh Gabi and Godin Tepe, and survey of the Kangavar Plain (1967-73: Hamlin 1973; 1974; Young 1966; 1969; 1975; 2004; Young & Levine 1974; see Gopnik & Rothman 2011 for a full summary of the history of fieldwork by the Godin Project in Kangavar). Their work documented a long succession of Neolithic and Chalcolithic painted traditions (at the site of Seh Gabi), a Late Chalcolithic local center with evidence for interaction with Mesopotamia and the Iranian Plateau (Godin VI), the southernmost spread of the Early Transcaucasian Culture (Godin IV), a long-lived Bronze Age monochrome painted tradition (Godin III:6-1), and a large Median fortification (Godin II). This stratified development continues to inspire studies into lowland-highland interactions during the Late Chalcolithic and historical geography of the Zagros during the Bronze Age, but often these studies rely on Godin Tepe as a stand-in for the entire central Zagros. The results from the Mahidasht Survey Project provide a counterbalance by demonstrating that ceramic stylistic traditions and technological aspects of manufacture were often highly localized in the numerous Zagros valleys. The excavations at Chogha Maran retrieved evidence for a long-lasting settlement during the fifth millennium BCE, contemporary with Seh Gabi, and a settlement of the EBA that was contemporary with Godin IV and Godin III:6, spanning the first half of the third millennium BCE. The material culture from the entire sequence at Chogha Maran differs substantially from that documented at Seh Gabi and Godin Tepe, even though the Mahidahst and Kermanshah plains are naturally connected with the Kangavar Valley by an easy, natural route through the mountains for a distance of ca. 100 km.

These differences in material culture highlight a more important factor in the development of Zagros societies than the east-west route that

connects Mahidasht with Kangavar. The Kuh-i Garin, which forms the highest range of the central Zagros, can be traced from west of Lake Urmia in the north (the so-called Chaîne Magistrale between Soran and Piranshahr) to Khorramabad in the south, forming a formidable barrier, transected by only a few major passes, that formed a cultural boundary throughout several episodes of human history. The general uniformity of material culture to the west of the Kuh-i Garin is supported by K. Abdi's work in the Islamabad Plain (Abdi 2002; 2003), which confirmed results from the Mahidasht Survey Project. Further west, the Kabir Kuh presents another major obstacle, which is reflected in the differences of the material culture in the Pusht-i Kuh region on its western side, which overall shows more similarities with the Mesopotamian lowlands.

2. Chogha Maran – History of excavations

Chogha Maran is located on the road leading north from Kermanshah to the intermontane valleys of Iranian Kurdistan. The site has a maximum extent of 6 ha, with a high mound of ca. 1 ha, making it one of the larger Chalcolithic to Bronze Age sites in a landscape dotted with small settlements. The 1975 survey identified the site as mainly Chalcolithic with some Iron Age occupation based on graves with Luristan bronzes and the presence of Black-on-Buff wares and so-called J Ware, spanning the end of the sixth through the fifth millennium BCE. The survey also identified a significant number of red-slipped sherds that were assumed to be Chalcolithic at the time of the survey and excavation, but later proved to be typical of the local EBA in the third millennium BCE.

Excavations at Chogha Maran lasted four weeks between July 9th and August 4th, 1978, under the supervision of Robin Dennell who was assisted by Jane Cowgill, Susan Pollock, and Hassan Tala'i. The team opened three small trenches located at recent cuts into the site to obtain a full sequence of occupation (Pl. 3). The western trench, operation 2, was quickly abandoned upon the discovery of recent burials. Operations 100 and 300 explored the northern side of the mound. Operation 100 was located at the top and operation 300 at the bottom of a large cut into the northern slope. Given the sloping deposits, the stratigraphic sequence of the two soundings overlapped chronologically. In operation 100, the excavators exposed the northern edge of an EBA settlement with trash deposits that were dumped down the slope. The bottom levels reached in this trench belonged to the

latest Chalcolithic occupation at the site. In operation 300, the upper 1.5m of deposits was formed by the same EBA trash dumps. These were deposited immediately on top of Chalcolithic levels that were contemporary with the lower deposits in operation 100. A test trench in operation 300 traced a sequence of earlier Chalcolithic and Late Neolithic occupation, but never reached virgin soil.

During the excavations, and based on the 1975 survey results, the excavators assumed that the upper levels of the mound were Chalcolithic in date, because the ceramic assemblage consisted predominantly of chaff-tempered, red-slipped ware vessels and grey burnished, small, carinated cups that technologically resemble Chalcolithic potting practices in the Zagros. However, the discovery of clay sealings with cylinder seal impressions, the presence of Godin III painted sherds, and the discovery of a Scarlet Ware vessel stratigraphically positioned below these levels forced the excavators to reconsider and date the levels with its unusual material to the EBA.

The excavation records are largely complete, although not all ceramics were processed.[6] These are still stored in the National Museum in Tehran, Iran, awaiting further analysis. Primary records consist of context sheets labeled with lot numbers that record date of excavation, horizontal and vertical extent, color, texture, compactness, and homogeneity. The records also record basic interpretation (e.g. floor, wall, fill, pit) and stratigraphic relationships to other contexts. In addition to context sheets, the records include rudimentary plan drawings for levels that contained architecture and section drawings. Combining the context sheet information with the plans and section drawings allows for a reevaluation of the stratigraphy, as described below. Finally, at the end of the excavation, the team produced a four-page summary as well as a preliminary phasing. This study and reevaluation of the Chogha Maran sequence is based on a detailed, archival

[6] The fieldwork season was eventually cut short following increasing reports of violent incidents in the summer of 1978 leading up to the Iranian Revolution, including a series of explosions in Kermanshah that could be heard from the project's house. The Mahidasht team became increasingly concerned for their safety and eventually reluctantly left Iran in a hurry. Part of the team made their way to Tehran where the archaeological materials were handed over to the National Museum, while another part made its way back to Europe overland just days before the borders were closed (L.D. Levine, S. Davis, and R. Dennel pers. comm.).

analysis at the ROM of the field notes, context sheets, plans and section drawings, and the narrative summary of the excavation.

3. Stratigraphy

3.1 Operation 100

Operation 100 was first laid out as a 6×3m trench at the top of a large cut into the northern slope of the mound. Immediately, three burials were identified, which were most likely Islamic and labeled as "modern" in the fieldnotes, even though their exact date remains uncertain. In order to reduce the number of graves to be removed to continue excavations, the trench was reduced to 4m width. In this trench, the excavators did not systematically note down elevations (or depth from the mound surface) so that any estimates provided here are largely based on extrapolations from the section drawings (Pl. 4).

Considering the small area of the sounding, the general poor preservation of occupation deposits at the mound's edge, and complex stratigraphic relationships, the field records at times offer contradicting interpretations. Here, we offer a revised interpretation of the stratigraphic sequence explored in Operation 100 (Table 1) based on an improved understanding of the ceramic chronology of the region, which has proven to be useful in solving the problems encountered by the original excavators. At the time of excavation, the main source of confusion was the assumption that the excavated material all dated to the Chalcolithic. However, upon return from the field, their work at Chogha Maran allowed the identification of an unknown EBA ceramic tradition.

Stratum 1

The top stratum contained three burials of unknown date, but adhering to general Islamic customs. These graves were dug from near the present-day mound surface with the actual human remains at the bottom of an east-west oriented, rectangular pit ca. 0.5-1.0m below the surface. In each grave, the body was laid down in a stretched position on its right side with the head toward the western end, facing south, after which the burial was covered with medium-sized stones (Pl. 5a).

Table 1 – Operation 100 stratigraphy and periodization (underlined lots are floor contexts).

stratum	lots	description	date
1	104, 105, 108	cemetery (three burials within operation 100)	Islamic
2	102, 103, 106	degraded settlement remains; possibly Middle Islamic	
3	114, 115, 116	cemetery (one burial within operation 100)	Iron Age
4a	109, 111, 112, 113, 119, 120	upper phase of Wall A-B building	EBA
4b	117, 118, 122, 124, 125, 126, 127, 128, 129	lower phase of Wall A-B building; trash deposits N of Wall A	
4c	130, 131, 132, 133, 134, 135, 136, 137, 138, 139, 140, 142, 143, 144, 145, 146, 147, 148, 149	first construction of Wall A; trash deposits against face of wall	
5	150, 151, 152	poorly preserved settlement remains; mainly bricky collapse	
6	153, 154, 155, 156	trash deposits on northern slope (not well documented)	
7	157, 158, 159, 160, 161, 162	*deliberate deposit of earlier material*	
8a	163, 166	degraded bricky collapse on a surface	EBA?
8b	164, 165, 167, 168, 169, 170, 172, 174, 176	occupation remains with (unrecognized) wall and kiln	
9	171, 173, 175, 177, 178, 179, 180, 181, 183, 184, 185, 187, 189	poorly preserved settlement remains; Wall C-D-E building	
10	182, 186, 188, 190, 191	poorly preserved settlement remains; mainly bricky collapse	LC 1 (RWB)
11	190, 192, 193, 194, 195, 196, 199, 403	series of Test Trench spits on a surface	
12	197	Test Trench spit on partially preserved stone pavement	
13a	400, 401, 402	settlement remains; Wall F-G-H building	
13b	404, 405	settlement remains; Wall F-G-H building	
14	406	Test Trench spit on a surface	
15	407, 408, 409	Test Trench spit on a surface; child burial beneath surface	
16	410	Test Trench spit	

Stratum 2

The upper 0.5-1.0m of deposits were heavily degraded and described as soft to medium, light brown, silty soil. In this matrix, there were several large stones that did not form any coherent plan. These deposits contained very mixed material that included glazed Islamic pottery as well as Chalcolithic and EBA pottery. At the bottom of this layer, a pavement constructed of large, flat stones stretched from the eastern to the western baulk in the northern half of the trench (Pl. 5a). The pottery on top of and mixed between these stones was still mixed, but continued to contain a significant amount of Islamic period pottery (labeled as "Seljuq" in the fieldnotes, which, if correct, would provide a date in the 12th century CE). Most likely, the top of this part of the mound was briefly occupied in the Middle Islamic period, but the remains from this settlement had been heavily disturbed and largely eroded away, at least in this part of the site.

Stratum 3

This does not constitute an actual layer, rather it identifies the presence of Iron Age graves at the site, while no evidence for a settlement of this period was detected. Within Operation 100, one Iron Age burial (Burial 4) was discovered, capped by the stone pavement of stratum 2. The burial was probably originally capped by stones as well, but these might have been conflated with the later stone pavement and only a few stones were recorded as part of the burial itself (Pl. 5b). Burial 4 was particularly noteworthy since it contained a large amount of material, including burnished red ware pottery (not drawn), bronze vessels, iron weapons, and iron armlets (Pl. 21). During the first visit to the site in 1975, the survey team also found an Iron Age grave protruding from a cut in the mound with evidence for a similar grave inventory (an Iron Age burnished red ware goblet with a handle, and a bronze situla).[7]

Stratum 4

Stratum 4 contains the remains of part of a settlement (Pl. 5b), which can be subdivided into three phases based on the identification during excavation of superimposed surfaces and the section drawing. During the bottom phase, 4c, a first version of Wall A was constructed, possibly with

[7] The bronze situla was restored at the Israel Museum in Jerusalem and subsequently returned to the National Museum of Iran in Tehran.

pisé/chineh, which ran east to west through the middle of the trench. This first wall was poorly preserved and the excavators doubted its existence, eventually considering this to be merely an area of collapse. However, in the section drawing (Pl. 4), which was produced largely independently from the horizontal excavations after they were completed, the bottom of a series of ash lenses in the northern part of the trench ran up against a bottom part of Wall A. These lenses sloped down ca. 0.50m toward the north and northwest. As a result, they were difficult to identify during excavation, which relied heavily on associating lots by approximate elevation across the trench. They are much better visible in the western section, but they can only be outlined generally in the eastern section. To the south of Wall A, in phase 4c, bricky collapse (probably from Wall A) overlay dark, brown clay and soft, brown silty soil, which in turn lay on top of a hard, yellowish brown clay that served as this phases surface. A small pit lined with burnt clay was dug from this level and is visible in the southern section.

In phase 4b, Wall A, expanded to a width of ca. 75cm, was rebuilt with mudbricks and a north-south wall (Wall B), ca. 45cm wide, was built against its southern face, creating two separate spaces along the southern baulk of the trench. These spaces were filled with ca. 15cm of occupational deposits on a surface. To the north of Wall A, a thick accumulation of ashy trash deposits lay against the wall. The bottom of these lenses sloped down at least 0.50m toward the northern edge of the trench, while the uppermost lenses were almost horizontal (presumably as the repeated trash dumps began to extend the edge of the mound).

Phase 4a represents continued occupation of the architecture formed by walls A and B in phase 4b. This phase can be best recognized in the southwestern space where the earlier occupation was separated from the phase 4a deposits by a hard, yellowish to light brown, silty clay surface that was covered by a uniform occupational deposit. In this space, a pit lined with burnt clay (ca. 8cm thick) was set in the floor, cutting through the earlier occupation. The southeastern space might not have a similar subdivision and instead was filled up gradually with a relatively uniform soft, brown silty clay deposit. However, this space was very small and partially disturbed by two grave cuts from stratum 1. To the north of Wall A, soft, dark brown clay lay on top of a hard, yellow surface, which covered the earlier ashy trash deposits. This area was disturbed by the Iron Age burial from stratum 3 and possibly by the construction of the stone pavement from stratum 2.

Stratum 5

The bottom of stratum 4 did not have a clear surface, but rather might have been the capping of stratum 5. Stratum 5 was not recognized during excavation as a separate level, but based on the deposit descriptions containing bricky collapse on a yellowish surface combined with the section drawings, we interpret this as the remains of a poorly preserved occupation level ca. 20-30cm thick. In the southern section, a concentration of "bricky collapse" could actually be the remains of a wall. In the western section, stratum 5 is represented by a layer of hard, brown, bricky clay that separates two phases of ashy trash deposits (stratum 4 and stratum 6 respectively). In the eastern section, this same hard, brown, bricky clay covers the lower trash deposits, but seems to be cut by the upper ashy trash deposits of stratum 4. An alternative interpretation of the stratum 5 deposits could be that this represents a deliberate leveling operation using architectural collapse and hard clay to form a somewhat flat, stable surface for the construction of new architecture in stratum 4 on top of the soft, sloping trash deposits from stratum 6.

Stratum 6

Stratum 6 consists only of a thick accumulation of ashy trash deposits on the northern slope. These lenses of deposits did not reach the southern part of the trench. In the eastern and western sections, they form a triangle that widens out to a thickness of ca. 80cm at the northern edge of the trench. Two interpretations for periodization are possible. We prefer the interpretation that these trash lenses were deposited over time associated with a settlement further into the mound that is not represented within the operation 100 trench. Alternatively, these deposits could be associated with the settlement remains of stratum 5, which subsequently was deliberately flattened and its architectural remains spread out to form a stable surface for the construction of the stratum 4 building. Unfortunately, the field notes do not differentiate between the lenses of trash deposits in the horizontal excavation and apparently work on these levels was done quickly in order to reach lower occupational deposits. Regardless, the material culture (pottery, objects, and seal impressions) from stratum 6 to stratum 4 is identical and can therefore be assigned to a single period within the EBA.

Stratum 7

Stratum 7 consists of a thick, sloping deposit, ca. 0.50-0.25m (narrowing at the northern edge of the mound) of hard, brown to yellowish brown

clay, which was interpreted as slope wash by the excavators. Considering the main buildup of material is in the southern part of the trench, inside the mound, such an interpretation seems unlikely. Instead, the deposits of this stratum formed the slope on which the later trash deposits were dumped.

As discussed in the pottery section, strata 7 to 9 are difficult to date because the sherds from their deposits were very mixed. However, interestingly, stratum 7 contains predominantly Chalcolithic sherds (mainly Red, White, and Black and Black-on-Buff sherds, but also several Late Neolithic J ware sherds). This leaves two possible interpretations. First, stratum 7 to 9 might have formed the upper levels of the Chalcolithic settlement. Stratum 7 would have formed the upper layer of the mound at the time when the EBA strata 5-6 settlements were established, which could account for the lack of recognizable contexts and architecture in a severely degraded matrix after more than a millennium of exposure to the elements. Alternatively, and in our opinion preferably, stratum 7 is the result of a mass deposit of soil dug up elsewhere at the mound (for example to dig a ditch or for a terracing operation). This second scenario would account for the relatively homogeneous nature of this matrix filled with a mixture of earlier material. It also allows for an interpretation of strata 8-9 as EBA occupation levels, which fits better with the small amount of recorded in-situ pottery from these levels and the presence of a pit with a Scarlet Ware vessel (see below).

Stratum 8

The field records for the excavation of stratum 8 are difficult to follow. At this point, the excavators had realized that they had dug through a deep series of sloping deposits, adapting their excavation strategy to a more localized recording in response. However, stratum 8 consisted of a fairly horizontal occupation level, with a higher preservation in the southern part of the trench, causing the slope upon which later deposits rested. The southern section records a possible wall, along with a significant amount of brick collapse next to it, but this was unfortunately not recognized during horizontal excavation. The main defining feature of stratum 8 is a kiln measuring ca. 1.50×1.0m and preserved to a height of ca. 40cm (Feature 3, Pl. 5c). The field notes are confused about the exact construction of this feature, but based on the section and the plan drawing, this was most likely a brick-lined kiln upon a stone foundation with a burnt clay base. Next to

this kiln, there were at least two deposits of ash, presumably from cleaning out the feature.

Stratum 8 might have consisted of two phases of occupation represented by two separate surfaces or, alternatively, the upper surface, which was not noticed during horizontal excavation, could have capped the stratum 8 architecture, in which case it would represent a separate stratum.

The date of stratum 8 is uncertain. On the one hand, the majority of the deposits seem to contain large numbers of Chalcolithic pottery. On the other hand, however, a large number of sherds retrieved from inside the kiln are EBA. Considering the patchy records for this stratum and the difficulty excavators had keeping deposits separated, it is possible that stratum 8 lots were heavily contaminated by stratum 7 material. This would especially be the case if stratum 7 was a deliberate deposit of soil to fill and seal the collapsed settlement remains in a terracing operation.

Stratum 9

Stratum 9 contains the remains of a small building, consisting of walls C, D, and E (Pl. 6a). These remains were not very well preserved, and the deposits were only ca. 25-30cm thick. A shallow pit, ca. 1.50m wide, dug from previous stratum 8, disturbed much of the remains in the eastern part of the trench, while the rest seems to have mainly consisted of collapsed and degraded bricky material. Again, many lots retrieved from stratum 9 contain mainly Chalcolithic pottery, but since most of the deposits consisted of collapsed architectural remains, these sherds could have been included in soil for brick manufacture or pisé/chineh construction. Material that was collected directly on top of the surfaces did contain several EBA sherds.

A pit was dug from a surface of this stratum in the southeastern edge of the trench in which a complete jar was set, which contained animal bones and carbonized seeds, with the sherds of a large, polychrome painted jar (Pl. 11:1) packed around the rim. This polychrome jar can be securely assigned to the EBA Scarlet Ware tradition based on both stylistic and technological aspects (Haerinck 2011: 62). Since this pit was clearly dug from the surface of stratum 9, which in turn was securely sealed by the surface of stratum 8 and covered by ca. 1.5m of deposits of strata 7-9, the original excavators could not formulate an explanation for the presence of an EBA vessel within levels with mainly Chalcolithic material. However, considering the presence of local EBA pottery in strata 8-9, especially in

a well-preserved kiln, as well as a few additional Scarlet Ware sherds in both stratum 8 and 9, it seems to us fairly certain that these occupation levels in fact dated to an earlier part of the EBA. That these deposits also contained large amounts of earlier Chalcolithic pottery attests to the high degree of movement of material within the mound resulting from human activity, especially for the production of building materials and possibly terracing operations. The only other possible explanation – that both the kiln and the stratum 9 pit were dug down 1 to 1.5m within earlier levels without any detectable trace of cuts in the upper levels – is highly unlikely.

Stratum 10

Stratum 10 is another poorly preserved level with few remains of architecture. In the eastern part of the trench and visible in the section, a large amount of mudbrick collapse is all that remains of the occupation in the excavated trench. The surface again slopes toward the north. The pottery of this stratum is exclusively Chalcolithic, so that possibly this was the uppermost Chalcolithic occupation and this stratum formed the top of the mound for a millennium.

Stratum 11

The excavation in the trench was reduced to a test trench in the northwestern quadrant, 2.25×2.25m and reaching a depth of ca. 6.50m below the mound surface at the top of operation 100 (Pl. 6b). The excavation of the test trench was largely conducted in random spits of ca. 10cm at a time, rather than following the stratigraphy.

Stratum 11 was mainly explored in this test trench, but it was also exposed in the northeastern quadrant when the workers decided they required an additional step to remove soil. At the bottom of this area, they encountered a stone foundation of the corner of a wall. In the section drawings of the test trench (Pl. 4), the bottom of stratum 11 contains at least one large stone and several smaller stones, indicating that excavation went through undetected architectural remains.

Stratum 12

Similarly, stratum 12 was dug in spits without identifying any architectural remains. Again, at the bottom of this stratum, the section drawings show several stones that could have served as wall foundations associated with a surface that was not detected in horizontal excavation.

Stratum 13

Stratum 13 was relatively substantial with parts of three walls – walls F, G, and H – within the test trench (Pl. 6c). The spaces formed by these walls contained at least two phases as indicated by superimposed floors, and possibly a third one that is only visible in the western section.

Stratum 14

Stratum 14 is a single spit below the lower surface of stratum 13. This spit reached a possible surface.

Stratum 15

While no architecture was encountered in this stratum, the excavators did encounter a thick, hard surface. Dug from this surface was a child burial in a painted bowl (Pl. 6d).

Stratum 16

Stratum 16 contains the lowest excavated deposit, immediately below the surface of stratum 15. Strata 10-16 contained a very similar material culture consisting mainly of Chalcolithic Red, White, and Black ware. While Black-on-Buff sherds appear throughout this sequence as well, they were more common in this bottom stratum 16, indicating perhaps that excavations had reached the transition to an earlier occupation.

3.2 Operation 200

Operation 200 was a 3×5m trench laid out at the top of a large cut into the southwestern part of the mound (Pl. 7). After one week of excavation, work in this trench was ceased because of the presence of five burials. These burials are described as "modern" in the field notes, but the description of their position and dimensions does not fit well with Islamic burial practices. At least one of the burials (Burial 4) contained two Iron Age ceramic vessels, one cup with a handle and one small jar (not drawn).

Immediately below the surface, a deposit of hard, light brown silty clay ca. 0.5m thick might have been the eroded remains of the last settlement at the site. Sherds from this layer were fairly mixed, but mainly "late" sherds (Iron Age and glazed Islamic era sherds), and an equal amount of EBA and Chalcolithic sherds.

Next, there was a soft, grey ashy deposit across the entire trench ca. 5-10cm thick that contained virtually no sherds. This ash lens rested on top of a hard, clayish deposit. In the northwestern corner of the trench, the field notes state that the ashy deposit was cut by hard bricky material that continued into the section. A possible interpretation is that this was the remains of a wall that was heavily degraded and largely removed by the later burial cuts. The ash lens could be material on top of a surface associated with this wall. Cut into this surface were five features. Two circular depressions ("fire pit"), ca. 30cm and 45cm in diameter respectively and 10-15cm deep, contained soft, grey ash and hard, burnt clay, both of which were interpreted as hearths. Another feature (Feature 2), 50cm in diameter and ca. 18cm deep, consisted of a ring of stones lined at the base with burnt clay. The fourth feature (Feature 1) could have been a large, oval-shaped hearth, measuring 34-108cm, and contained a concentration of small, rounded pebbles in a hard clay matrix. The fifth feature is a large pit in the northern edge of the trench. Since no pottery from this level was retrieved or recorded, no date can be assigned.

Finally, the lowest deposits excavated belonged to a hard, light brown, bricky and clay layer that covered the entire trench. This layer was explored to a depth of maximum 1.5m. In parallel with findings in operations 100 and 300, this could have been the top of an underlaying stratum consisting of collapsed and degraded architecture. This layer contained relatively large amounts of pottery, mainly dating to the Chalcolithic (predominantly Red, White, and Black ware). In other words, the Chalcolithic settlement was near the top of the surface in this part of the site, possibly with only poorly eroded remnants of an EBA settlement in the upper deposits.

3.3 Operation 300

Operation 300 consisted of a single trench at the bottom of the large cut into the northern slope of the mound. The trench was originally laid out as a 4×4m sounding and its northeastern quadrant was extended to the edge of the slope (ca. 2×2m). Following the initial clearing of the top 30cm, the trench excavator decided to dig a test trench of 2×1.5m in the southeastern quadrant. Excavations in Operation 300 were largely conducted in random spits in the different quadrants, rather than documenting individual deposits, which complicates the reconstruction of horizontal occupation levels or the contemporaneity of lots collected from the sloping trash deposits. The

northwestern quadrant was only excavated to a depth of 1.15m below the surface. The southwestern quadrant was taken down to 2.90m below the surface, the northeastern quadrant and its adjoining northern extension to 2.85m, and the test trench in the southeastern quadrant was dug to a depth of 5.50m.

Following the notes by the excavation supervisor, Operation 300 can be subdivided into six strata (Table 2). Our own analysis of the records and the ceramic finds allow a slight modification to their initial division of these strata, but we largely maintain their original assessment considering that they had access to the actual sections rather than the schematic drawings in the archive (Pl. 4).

Table 2 – Operation 300 stratigraphy and periodization
(underlined lots are floor contexts).

stratum		lots	description	date
1	a	302, 303, 317	trash deposits	EBA
	b	308, 309, 319, 322, 324, 326	trash deposits	EBA
	c	304, 312, 313, 315, 329	trash deposits	EBA
	d	316, 330, 331	trash deposits	EBA
	e	305, 318	hard brown silty clay surface	EBA
	f	306, 320, 321, 323, 327, 333	trash deposits on hard light brown clay surface	EBA
2		307, 310, 311, 314, 325, 328, 332, 334, 335, 336, 337, 340, 341, 342, 347, 351, 352	poorly preserved architecture on a surface, possibly with a kiln	RWB
3	a	338, 339, 343, 350, 353, 354, 355, 357	architecture with a room filled with complete vessels	RWB
	b	344, 346, 348, 349, 356, 367, 368	architecture with three child burials under the floor	RWB
4		358, 359, 360	dark brown, soft ashy clay with flecks of charcoal	BOB
5		361, <u>362</u>	well-preserved mudbrick NW-SE wall with associated floor	BOB-J
6		363, 364, 365, 366	brown, bricky deposits, probably top of lower architectural level	J

In addition, two burials were exposed while opening the northern extension. These were not very deep (ca. 0.5m below the surface) and were labeled as "modern" by the excavators. However, at least one of these, and possibly both, must have dated to the Iron Age since the pottery records include two vessels from these deposits labeled as "Iron Age burial pots". Another burial was detected in the section ca. 1.90m below the surface just to the south of these, but with no indication of its date. In the northwestern corner of the excavation, a child burial measuring ca. 0.50×0.50m was excavated ca. 35cm below the surface. This child burial contained an iron spiral bracelet (Pl. 22:5) and should therefore most likely be considered contemporary to the Iron Age burials in the northeastern part of the trench.

Stratum 1

The top stratum consists of a thick accumulation of ashy lenses and deposits of soft, light brown silty clay that slope downward from south to north, reaching a depth of 1.40-1.75m from the surface of the mound. As in operation 100, these trash deposits might represent two major episodes, each of which resting on top of a hard brown silty clay surface, which possibly represents the surface of the mound at the time. The upper surface was encountered at a depth of 0.85-1.30m, while the lower surface could be identified at 1.40-1.75m. The intermediate lenses consist of very soft, grey, ashy deposits and soft, light brown, silty clay deposits. Pot sherds and impressed sealings equate these deposits with the similar ashy lenses in operation 100 at the top of the slope and they can be securely dated to the site's EBA occupation.

Stratum 2

Stratum 2 ranges from 1.75m below the surface to a depth of 2.30m. The excavators had grouped the lowest EBA deposits with stratum 2, providing a starting depth of 0.90m, but our analysis of the pot sherds from those lower deposits do not support such an interpretation. Instead, what they considered a potential outside surface at a depth of 1.40m (near the southern baulk) was actually more likely the surface of the mound at the time when the first EBA burnt trash was deposited down the site's northern slope. Immediately below those EBA deposits were heavily eroded occupational deposits from the Chalcolithic period. Regardless, the interface between the EBA trash deposits and the uppermost Chalcolithic deposits

was unclear, which has resulted in a larger degree of mixed material in lots from stratum 2 and the lowest stratum 1.

The excavator of the trench noted the presence of a north-south wall along the western baulk in the northern extension from a depth of 1.75m to ca. 2.30m, as well as a north-south alignment of stones at 2.20m that could have been the foundation of a wall in the northeastern quadrant. Based on their sketches, it is possible that these two features align and formed a single wall (as reconstructed in the plan drawing; Pl. 8a) that was otherwise not recognized in the spits in the southeastern test trench. To the east of this row of stones was a semi-circular alignment of bricky material, which could represent a separate feature constructed on this level's surface.

The upper deposits of Stratum 2 (1.75-1.95m) formed a hard, light brown, bricky matrix that might be collapsed and degraded remains. This matrix capped occupational deposits ca. 25cm thick, which are described as soft, brown, silty deposits with some ash that laid against the wall.

Stratum 3

Stratum 3 consists of two phases that perhaps represent a rebuilding of the same structure. Continuation in alignment allows an interpretation of the architecture of stratum 2 as a possible third rebuilding, but due to the uncertainties in the excavation records, we have decided to maintain the excavator's original strata division.

The upper phase, stratum 3a (2.30-2.85m), consisted of a north-south wall that was traced through the northern extension and the northeastern quadrant, but was not detected in the spits in the test trench of the south-eastern quadrant (Pl. 8b). A perpendicular wall against its western face could be identified in the northeastern quadrant and another wall face in the southwestern quadrant forming a corner. The space created by these walls contained a surface upon which lay a dense cluster of whole and broken vessels, mixed with ash.[8]

The lower phase, stratum 3b (2.85-3.50m), was only exposed in the test trench in the southeastern quadrant. It contained a north-south wall, in the same alignment as the wall from stratum 3a, with two perpendicular walls: one against its eastern face and running into the eastern baulk; the other

[8] Confusingly, this cluster of pottery was not identified in the test trench of the south-eastern quadrant.

against its western face and parallel to the southern baulk (but not visible, or at least not recorded, in the section drawing) (Pl. 8c). The surface associated with these walls again contained a large number of sherds mixed with ash and charcoal.[9] Below and sealed by this surface, there was a burial of a child (at ca. 3.25m below the trench surface). The burial measured ca. 0.5×0.7m and was located in the southeastern corner. According to the field notes, the skeleton was incomplete, and the bones disjointed, indicating a secondary burial. Two additional child burials were encountered at ca. 3.80m below the trench surface, which means that they were most likely dug from a lower surface of Stratum 3b. The field notes do not provide additional information other than that one of these burials was in a jar.

The ceramic analysis of strata 2-3 reveal a fairly consistent assemblage characterized by large amounts of Chalcolithic Red, White, and Black ware. This consistency supports our suggestion that these two strata represent a single phase of occupation that lasted long enough for its architecture to be rebuilt several times.

Stratum 4

Stratum 4 (3.5-4.4m) produced no architecture, but since it was only explored within the small test trench this could merely mean that the area of excavation was in an open area of a settlement. The deposits of the stratum are described as dark brown, soft ashy clay with flecks of charcoal. According to the excavators, these deposits could be either slope wash or collapsed and degraded pisé/chineh and mudbrick architecture that was exposed to the elements for an undefined amount of time. Either way, it is possible that there was a hiatus of unknown duration. The pottery from this stratum still contains Red, White, and Black ware, but with a high number of Black-on-Buff ware mixed with small amounts of Dalma-related material. Either this stratum belongs to a transitional occupation or if it represents a hiatus, material from the upper and lower strata could have been mixed.

[9] It is perhaps tempting to equate this concentration of pottery with the cluster from stratum 3a, but the elevations differ (ca. 30cm), and this concentration of pottery was recorded as coming from the western side of the north-south wall.

Stratum 5

Stratum 5 (4.4-4.8m) contains a mudbrick wall, oriented northwest-southeast (Pl. 8d), that was preserved seven courses high (0.96m wide and 0.6m high), as visible in the southern section (mudbricks sized 26×9cm). On either side of the wall, greyish brown clay deposits lay on top of a surface that consisted of hard, light brown, bricky clay. Alternatively, this bricky matrix could be the top of the lower level that served as a surface for stratum 5. The pottery assemblage from stratum 5 is dominated by Black-on-Buff ware.

Stratum 6

At the bottom of the test trench, five layers of soft to medium-hard, brown, bricky deposits were excavated (4.85-5.5m). There were no architectural remains visible. The trench did not reach virgin soil, so that even earlier levels may remain unexplored. The pottery from Stratum 6 is characterized by so-called J ware, which is typical for the late Neolithic in the region.

4. Pottery

The excavations at Chogha Maran explored a stratigraphic sequence of the fifth and early third millennium BCE, with a long hiatus spanning the fourth millennium (Fig. 3).[10] Both periods were characterized by highly localized practices in ceramic production with only very few parallels outside the central Zagros. The defining ceramic wares of these periods – EBA "Maran Red & Grey-Slipped ware" and Chalcolithic "Red, White, and Black ware" – are still only documented in detail by the Mahidasht Survey Project. At the time of excavation in 1978, the novelty of these ceramic traditions created difficulties in assessing both the relative and

[10] The battleship graph of figure 3 parallels an earlier version published by E. Henrickson (1985: Fig. 5), but the actual sherd counts and percentages differ. The graph presented here is based on the available sherd count lists in the archive and our reanalysis of the stratigraphic sequence. The graph presented by Henrickson only includes contexts that were considered 'primary' during excavation, but as far as could be determined in the archive, her data compilation notes are no longer preserved and we only have her final graphs. Presumably, any differences can be largely explained by our new stratigraphic phasing, including a reallocation of specific contexts to different strata. Still, although the exact counts differ, the overall trends observed in both graphs are the same.

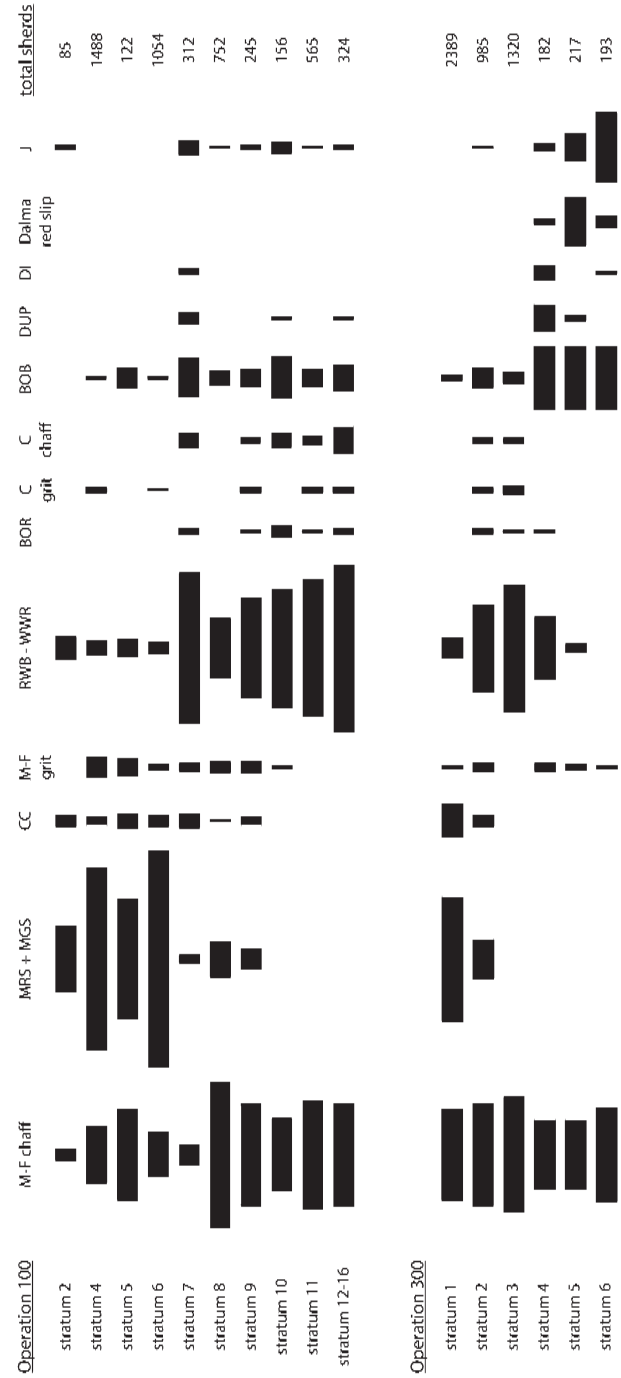

Fig. 3. Battleship graph showing frequency of main pottery ware types per stratum (based on a combination of recorded diagnostic sherds from all contexts and counts of non-diagnostic sherds from 'primary' and 'secondary' contexts).

absolute chronology of the associated occupation. Red, White, and Black ware was quickly recognized as a Chalcolithic type based on general stylistic parallels with the late 'Ubaid tradition of central Mesopotamia. Maran Red & Grey-Slipped ware, on the other hand, was wrongfully labeled as Chalcolithic. This assumption was made based on the long-lasting use of red-slipped fabrics during the Chalcolithic in the central Zagros, well documented at Godin Tepe and Seh Gabi as well as other survey projects, and the lack of identifiable painted vessels in the associated deposits, other than residual Chalcolithic sherds. However, the discovery of a large corpus of clay sealings with cylinder seal impressions (see below) that could be dated to the early middle of the third millennium BCE based on parallels with the lower Diyala region overturned the excavators' assumptions regarding Maran Red-Slipped ware. Such a date could then be further confirmed by ceramic parallels at Godin Tepe in the early levels of Godin period III and the presence of a polychrome painted jar and several sherds of Scarlet Ware throughout the upper Chogha Maran levels.

This confusion about ceramic chronology affected the pottery recording. The Mahidasht Survey Project had adopted a pottery recording system based on *wares*, which were largely defined by fabric colors, types and quantities of temper, firing quality, and surface treatment. Unfortunately, with a lack of a pre-defined sequence of ceramic development other than a few major characteristic Chalcolithic, Iron Age, and Islamic types that had been documented at excavations throughout the Zagros, many of the ware types used during survey are not chronologically distinct, and, before a reliable excavation of the complete range of occupation history in the region, sherds from different periods were often grouped together. This was especially the case for Maran Red-Slipped ware, which was catalogued during the two seasons of survey as part of different kinds of general red slipped wares that in retrospect include material from the entire Chalcolithic and possibly also the Iron Age. In addition, only a relatively small subset of the pottery was drawn and/or photographed, but even with drawings, disentangling sherds from different periods remains difficult since often vessel shapes were not very distinct, except for a few types.

This recording system was also applied in the short exploratory excavations, including at Chogha Maran. By the time of excavation at this site in 1978, an improved understanding of the Chalcolithic ceramic development allowed for a reliable identification of those ware types. But for the Early Bronze Age occupation, which was only identified as such during

post-fieldwork analysis, only Maran Red-Slipped ware and so-called Carinated Cuplets were recorded separately. Any other pottery from the Early Bronze Age deposits was subsumed under multiple general categories of fine to coarse, chaff or grit tempered wares. As a result, these wares combine sherds from all levels at the site and cannot be used to assess period assemblages.

Finally, it should be noted that non-diagnostic sherds were not systematically recorded. All diagnostic sherds were counted and numbered, but non-diagnostic sherds were only counted for selected deposits. As a result, the statistics presented here can only be an approximation. Especially for those levels that were considered to be slope wash or otherwise tertiary in nature during excavation, non-diagnostic counts are largely lacking.

4.1 Main ware types

Maran Red Slipped ware (MRS)

Vessels of this ware are typically handmade with a fabric that consists of medium chaff temper (with occasionally a small amount of grit), which is reddish brown to red with a black core. The surface was smoothed before the application of a thin red slip on both sides that was sometimes burnished to a high gloss. Up to 90% of sherds of this type belong to globular jars with an everted rim and plain, hemispherical bowls.

Maran Grey Slipped ware (MGS)

A less frequent variant of MRS is grey-slipped. Sherds of this ware more commonly have medium white grit added to the medium chaff. The fabric is dark grey, sometimes slightly brownish grey, with an even darker core. Both the outer and inner surface has a greyish brown to black slip. The outer surface is usually heavily burnished, while the inner surface is merely smoothed. This ware is significantly more common among everted rim jars and only rarely attested for bowls, which indicates that the different color was intentional and not just a result of lack of control over firing conditions.

Carinated Cuplets (CC)

These small cups are closely related to MRS and MGS in their production method. They are handmade with a chaff-tempered fabric. The fabric is usually dark grey to black with a black core. The surface is always

heavily burnished to a very smooth sheen. A very few sherds of this type have a reddish to brown color instead of the distinct dark grey to black. A small subset of these cups has a row of incisions or fingernail impressions on the carination, which is sometimes filled with a white paste. This general appearance is reminiscent of Kura-Araxes or Early Transcaucasian pottery that was widely used in nearby valleys to the east, but it differs in production method (e.g. chaff temper instead of grog temper), and the vessel type of small carinated cups is not attested among Kura-Araxes assemblages.

Plain chaff-tempered wares

The vast majority of plain ware sherds from all periods at Chogha Maran are chaff-tempered, as are most of the painted sherds. These typically have a red fabric. A variant with a buff fabric that is usually well-fired and homogeneous occurs mainly in the Early Chalcolithic and Late Neolithic levels.

These wares can be subdivided into two categories: one with medium to fine chaff temper (MF chaff) and one with coarse chaff temper (C chaff). The first occurs throughout the entire sequence, but it is slightly more prevalent in the Chalcolithic levels. However, this is probably because in the Early Bronze Age levels, MRS and MGS form the majority of the assemblage, which are also medium chaff-tempered and could be considered a distinct variant of M-F chaff ware. C chaff ware, on the other hand, clearly cluster in the upper Chalcolithic levels, those characterized by Red, White, and Black ware, albeit in relatively small numbers.

Plain grit-tempered wares

Grit-tempered wares are generally far less common in the Chogha Maran sequence. Again, these can be subdivided into two categories: one with medium to fine grit temper (MF grit) and one with coarse grit temper (C grit).

Many MF grit-tempered vessels are described as wheelmade,[11] with the amount of grit ranging from very little to a lot, and with the occasional presence of small amounts of chaff. Their surface can be reddish brown,

[11] It should be noted that in ceramic studies of the 1970s-80s, sherds that show any striations were labeled as "wheelmade", while today reanalysis of such material often reveals misidentifications of vessels that were either finished or wiped on a slow rotary mechanism that predates the introduction of fast wheel ceramic production.

greyish brown, or cream-colored. The fabric is usually fairly homogeneous in color, but a few sherds have a dark core. The range in these characterizations possibly reveals that this is a heterogeneous category, which combines grit-tempered sherds from different periods. Still, they are most common in the Early Bronze Age levels, with a second, smaller cluster in the lower Chalcolithic levels.

C grit-tempered ware is much less common and, parallel with C chaff ware, clusters in the upper Chalcolithic levels. Vessels of this ware are always reddish brown to dark brown.

Red, White, and Black ware (RWB)

This type of painted pottery was first defined at Chogha Maran. It is difficult to identify in survey because often the painted decoration and the white wash have worn off, leaving behind a plain, reddish sherd. This handmade, well-fired ware has a fine fabric with sparse, small chaff temper and occasionally some added fine, sand temper. The color of the paste is typically reddish buff, but it can occasionally range between pinkish brown/buff, pale yellow, or even light grey. The surface is smoothed and covered with a white wash, usually both on the inside and outside of the vessel, upon which black geometric designs are applied with black paint on the upper portion of the exterior. In addition, a separate ware was defined that lacks the black paint (WWR: White-Washed Red ware), which could either be from the lower body of painted vessels or from unpainted vessels. The painted sherds generally outnumber the unpainted ones, but this could be a result of the deficiencies in recording non-diagnostic sherds.

Black-on-Red ware (BOR)

BOR is rare at Chogha Maran and in the entire survey record, but it is an important diagnostic type. Sherds assigned to this ware were handmade, well-fired, and with medium to fine chaff temper. The fabric is dark red throughout and the exterior surface has black paint applied in geometric designs. In the Chogha Maran sequence, this ware clusters in the upper Chalcolithic levels characterized by RWB, with which it should be considered contemporary.

Black-on-Buff ware (BOB)

BOB was largely defined by the excavations at Tepe Siahbid, but it had already been identified during the survey. This handmade ware is

characterized by the application of black paint on the well-smoothed surface of a buff fabric. Sherds either have fine chaff or fine grit temper, sometimes lacking visible temper completely. At Chogha Maran, BOB sherds occur throughout the sequence, possibly as a result of the movement of material at the site for the production of building materials. However, they are only characteristic for the lower Chalcolithic levels in operation 300 (mainly strata 4 and 5).

Dalma Untempered Painted ware (DUP)

Originally called Dalma "'Ubaid" Painted ware due to stylistic parallels with the Chalcolithic Mesopotamian tradition, further analysis showed that this ware represents a different production, probably local to the central Zagros. DUP sherds are described as a fine red ware that is painted with a thin, greyish matte paint. Sherds lack visible temper and are very well-fired. Their surface has been smoothed on both surfaces but shows no signs of slipping. They are generally rare at Chogha Maran, but they seem to be restricted to the Chalcolithic stratum 4 in operation 300.

Dalma Impressed ware (DI)

At the beginning of the survey project, Dalma material culture, as defined at the type site Dalma Tepe and also at Seh Gabi nearby Godin Tepe, was well-known and easy to identify. Dalma Impressed ware is a handmade ware with medium to coarse chaff temper and a buff to reddish brown fabric. In the Mahidasht survey, Dalma Impressed ware can be either covered by a reddish slip or left untreated. Characteristic of this ware is the application of dense impressions or incisions over almost the entire exterior surface. Sherds of this type are rare at Chogha Maran and, together with DUP, are largely restricted to Chalcolithic stratum 4 in operation 300.

Dalma Red-Slipped ware (Dalma RS)

Based on the fieldwork team's experience with the Dalma tradition, the red-slipped plain ware that was common in Dalma assemblages could be identified as distinct from other red-slipped wares (such as MRS). Sherds of this ware have small and medium chaff temper, and they have a characteristic brittle, flaky red slip. At Chogha Maran, sherds of this ware were found only in the lower Chalcolithic levels, especially in stratum 5 of operation 300.

J ware (J)

J ware was defined already during the first season of survey as a highly distinct painted tradition local to the Mahidasht region. The letter J has no meaning, it was merely assigned this letter in a sequence of new wares identified among a small collection from the earlier Braidwood Iranian Prehistory Project in preparation for fieldwork. J ware sherds are hand-made with a fine to medium-fine fabric with fine grit temper. J ware encompasses a range of decoration types. Most commonly, sherds of this ware are covered with a thin slip, ranging in color from red to dark brown, upon which a thin, horizontal line is painted in red, white, or black. Occasionally, vessels are treated with more than a simple line, sometimes even with a relatively complex pattern of polychrome, geometric motifs. Stylistically, this ware is comparable to the late Halaf tradition in Mesopotamia (Henrickson 1985: 69; 1986: 89-90; Levine & McDonald 1977; Levine & Young 1987: 19-21; Sharp & Kaercher 2018). Sherds of this ware were found occasionally throughout the Chogha Maran sequence, but they characterize the lowest level reached in operation 300 (stratum 6).

4.2 Period assemblages and chronological assessment of strata

Early Bronze Age (ca. 3000-2500 BCE) (Op. 100: 4-9; Op. 300: 1)

MRS characterizes the upper phase of the EBA occupation at Chogha Maran (strata 4-6 in operation 100 and stratum 1 in operation 300). MRS forms between 40-50% of the EBA assemblage and when combined with the closely related MGS, the percentage goes up to 55-75%.[12] Plain, chaff-tempered, red ware forms another 20-30%, so that combined plain, chaff-tempered wares constitute at least 75% of the entire assemblage. Small, burnished grey cups (CC) are the next most common ceramic type at ca. 5% of the assemblage. However, these cups are more common in the trash deposits (ca. 10%). Finally, MF grit ware makes up at most 5% of the assemblage. The rest are earlier Chalcolithic sherds, especially RWB

[12] Percentages are based on the total amount of documented sherds in each stratum, which also include significant numbers of earlier pottery that was either residual within these contexts or mixed with EBA deposits in areas where there was less control over the stratigraphy during excavation.

Total recorded sherds per stratum: Op. 100: 1488 sherds in stratum 4, 122 sherds in stratum 5, 1054 sherds in stratum 6, 311 sherds in stratum 7, 752 sherds in stratum 8, 245 sherds in stratum 9; Op. 300: 2389 sherds in stratum 1. These totals combine diagnostic sherd records and non-diagnostic sherd counts of recognizable ware types.

and BOB, that were mixed in through human activity at the site. In addition, 27 Scarlet Ware sherds and 8 Godin III painted sherds (both MF grit ware) were found in several contexts of these levels. Most of the Scarlet Ware sherds were retrieved from the lower trash deposits, but only one of these was drawn. Otherwise, only the one complete Scarlet War jar that was retrieved from a pit in stratum 9 of operation 100 has a drawing.[13]

In operation 100, the chronology of strata 7-9 remain difficult to assess. Very few non-diagnostic sherds from these levels were counted, which significantly skews the total statistical count. If MRS and MGS body sherds would have been counted for strata 7-9, the percentage of this characteristic EBA ware would certainly have been much higher.[14] Still, even without the non-diagnostic counts, MRS and MGS, as well as the small cups (CC) are present in strata 7-9 but disappear in stratum 10 and below (Fig. 3). MF grit ware sherds also reduce significantly in number in stratum 10 and below, while a few Scarlet Ware and Godin III painted sherds are recorded in strata 8-9, but not below, creating a clear divide in the ceramic assemblages between strata 9 and 10. The presence of these sherds, and especially the complete Scarlet Ware vessel from the pit in stratum 9, form a terminus postquem and allow us to identify these levels as EBA occupation.

Finally, the identification of stratum 7 as a deliberate mass deposit of soil dug up from earlier occupation elsewhere at the site is supported by the stratigraphic distribution of Chalcolithic pottery. The graph in Fig. 3 shows a significant amount of Chalcolithic RWB, BOB, DUP, and J wares, as well as a few C chaff ware and Dalma Impressed ware sherds, in stratum 7, with percentages that resemble their occurrences in the lower Chalcolithic strata.

The EBA functional assemblage is quite limited in range, consisting mainly of plain rounded bowls (Pl. 9:1-8), everted-rim jars (Pl. 10:6-22),

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[13] A few Godin III painted sherds were drawn, but the original drawings could not be found in the archive. The drawings here are based on their publication in Levine & Young 1987: Fig. 31.

[14] Non-diagnostic sherd counts were only done for contexts that were considered ‘primary’ or ‘secondary’ during excavation. The high counts of MRS and MGS in strata 4-6 is for a large part due to body sherd counts. Strata 7-9 were particularly complicated as they were less well preserved and difficult to disentangle from the sloping trash deposits within the small excavation area, so that almost all deposits were labeled as ‘tertiary’ and no body sherds were counted.

hole-mouth jars (Pl. 10:24-27), and lids (Pl. 10:4) constituting a domestic assemblage with cooking vessels, small-scale storage, and daily food consumption.

Bowls typically have a rounded wall, sometimes leading to a slightly inverted rim. They are almost all of MRS ware, although a few MGS bowls were also documented. Additionally, a few rarer types include large bowls with at least one ledge attached to the inner rim (Pl. 9:13-14) and smaller straight-sided bowls (Pl. 9:9-12). Small carinated cups (CC) occur in most EBA contexts, but they were significantly more common in the trash deposits (Pl. 11:9-20). Considering their very small size and their special surface treatment (heavily burnished and occasionally carrying impressions filled with a white paste), we interpret these as specialized drinking cups. Possibly the liquid that was drank from these cups had a powerful taste or another special property (e.g. alcohol content; psychedelics) that would only be consumed in small amounts at a time, which indicates a feasting context.

While everted-rim jars are relatively standardized in shape and size (with medium-sized and large versions), a small subset of these have appliqué handles in different shapes and very few have a single loop handle from rim to shoulder. Everted-rim and hole-mouth jars, occur in both MRS (two thirds) and MGS (one third) wares. Much rarer are so-called "slosh-proof jars", which are very large jars with an everted rim and an internal, downward-leaning ledge along the entire rim (Pl. 10:23). Based on the limited documentation, most of these jars were red-slipped and classified as MRS. At Godin Tepe, the function of this ledge was interpreted to hold back any drab while pouring a liquid (Henrickson 1984: 385, Fig. 72.1-3; Levine & Young 1987: Fig. 25.7). An alternative interpretation could be that these ledges were simply intended to support a lid. Only one of such jars at Chogha Maran was drawn and it was found in one of the trash deposits, which could fit with an interpretation of feasting and the storing of special liquids in large vessels for such an event. Finally, painted pottery was very rare and only attested on closed vessels (Pl. 11:1-8). Again, these were mainly found in the trash deposits, providing further indication for their association with special events.

Dating the MRS assemblage proved difficult at the time of excavation due to general similarities with the long-lasting, red-slipped Chalcolithic traditions of the Zagros. Eventually, the analysis of the large corpus of sealings provided evidence for a date in the third millennium BCE, most

likely the second quarter (ca. 2750-2500 BCE), contemporary with late Early Dynastic I in Mesopotamia, although an even earlier date in the first quarter remains a possibility (see below). The ceramic corpus itself also supports such a date. Scarlet Ware and Godin III painted sherds offer the most obvious support for this chronology, but MRS itself was also found in small quantities in EBA contexts at Godin Tepe. So-called "slosh-proof jars" were found in the lowest levels of Godin period III:6 and have in recent years also been documented in excavations of EBA occupation in Iraqi Kurdistan, especially at Kani Shaie (Renette 2018: 223, Fig. V.48; Renette et al. in press).[15] As for the lower EBA levels (strata 8-9), their date cannot be pinpointed more precisely than sometime between 3000-2600 BCE.

Late Chalcolithic 1 (ca. 4600-4200 BCE) (Op. 100: 10-16; Op. 300: 2-3)

The levels below the EBA occupation show a distinct change in material culture. The dominant ware in these levels is RWB, a distinct painted ware, and unpainted sherds of the same ware (WWR), which together account for 40-50% of the assemblages.[16] The inconsistencies in the non-diagnostic counts do not allow a reliable assessment of the ratio of painted RWB versus unpainted WWR, but in the available data, painted sherds tend to be more prevalent. In addition, MF chaff ware sherds, which constitute 30-35% of these level assemblages, could contain a significant number of sherds that have lost their white wash or at least vessels that represent an untreated plain variant of the same reddish ware production. BOB painted vessels are present in small, but statistically relevant numbers within this phase, especially in the lower deposits. RWB and BOB share general vessel shapes and stylistic traits, which suggests a gradual transition and a degree of continuity from the earlier Chalcolithic.

The general category of reddish M-F chaff ware is supplemented by smaller amounts of C chaff ware (ca. 5%) and C grit ware (ca. 2%). Based on the few drawings of C grit ware sherds, this ware could have been used

[15] Additional "slosh-proof jars" have been found at Logardan (Zingarello 2019: Fig. 7). There, the excavators date them to the end of the third millennium BCE.

[16] Total recorded sherds per stratum: Op. 100: 156 sherds in stratum 10, 565 sherds in stratum 11, 324 sherds in the combined strata 12-16 from the small test trench; Op. 300: 981 sherds in stratum 2 and 1320 sherds in stratum 3.

mainly for cooking vessels (Pl. 13:4,8-9,14-18). Finally, the distinct BOR sherds form another 1-2% of the assemblages (Pl. 16:14-22).

The functional assemblage of this period is restricted mainly to conical bowls (Pl. 12:6-21), angle-neck jars with a plain everted rim (Pl. 13:4-8), a few hole-mouth jars (Pl. 13:1,9), and trays (Pl. 12:22-26). Conical bowls are always made with reddish (or occasionally buff) chaff-tempered ware (both medium-fine and coarse), and they only rarely have additional surface treatment such as red slip or white wash. They occur in two sizes: a single-serve size bowl with a diameter between 15-25cm, and a larger bowl with a diameter above 30cm that mostly is made with coarse chaff temper. In addition, a few individual drawings document a red-slipped, internally beveled rim bowl that was heavily chaff-tempered (Pl. 12:2), a few very small cups (Pl. 12:3-4), and a fine chaff-tempered, S-walled cup (Pl. 12:5).

Two trays have a very low rim and could have served as cooking surfaces, considering at least one of these is C grit ware (Pl. 12:25-26). The other trays, which are mainly chaff-tempered, have a higher rim and could have been used as basins for various purposes.

Everted rim jars on the other hand were typically made with grit temper (predominantly C grit). They can be divided into three main shapes: globular jars with a distinct angular rim profile (Pl. 13:4-8,15-17); jars with a folded-over rim, which could have served as cooking pots (Pl. 13:13-14); and straight-sided jars with a lid support (Pl. 13:2-3), one of which has MF grit while the other has fine chaff temper and a white wash as surface treatment. Globular hole-mouth jars also occur, but they are rare. Two documented vessels, which have a thickened rim, are made with C grit ware and could have served as cooking pots (Pl. 13:9,18), while another is chaff-tempered and more likely functioned as a serving vessel, since it originally had a spout (Pl. 13:1).

The RWB painted wares include many of the same vessel types, with a few shapes that are not attested as plain ware. The most common painted ware is a conical bowl with a slightly rounded base that has a single painted band on the rim, which can extend on either the inner or outer side and occasionally forms a thick, undulating band on the interior of the rim (Pl. 14:8-26). A few deep bowls have a more elaborate geometric design below the exterior rim, typically consisting of a register with a repetitive design (zigzags; horizontal or diagonal lines) with a thick, solid band below (Pl. 14:1-3,7).

The most distinctive RWB painted vessels are medium-sized pots, either with a rounded (Pl. 16:8-13) or straight-sided (Pl. 15:10-16) body. Simple versions have a single painted band on the rim or a series of painted horizontal bands below the exterior rim. Others have a more elaborate geometric design, restricted to the upper part of the vessel, that again typically consists of a single register with a repeating motif framed by a thin band on the rim at the top and a thick band, or rarely a guirlande, at the bottom. A similar pattern also occurs occasionally on jars with a slightly upturned rim (Pl. 15:2-3,5-6,8-9) or rarely on hole-mouth jars (Pl. 15:1,4,7).

Finally, a separate small group of vessels are solid red with black lines or geometric designs painted on top (BOR; Pl. 15:14-22). The shapes of these vessels are generally the same as the RWB assemblage, as is the decorative pattern with either a single painted band on the rim or a single register below the exterior rim, which suggests that these vessels were locally produced and fully integrated within the local tradition.

The chronology of this ceramic assemblage and the associated levels of occupation at Chogha Maran can only be broadly defined based on indirect evidence. Unfortunately, there are no radiocarbon dates available for Chogha Maran, so that we need to rely on stylistic parallels, which is complicated by the high degree of regionalization both within the Zagros and more generally during the middle of the fifth millennium BCE. E. Henrickson's original analysis of this material determined stylistic parallels with the late 'Ubaid tradition of northern Mesopotamia (Henrickson 1985: 73-74; 1986: 122-123; 1989: 392-397). A recent analysis of the Zagros Chalcolithic ceramic chronology emphasized the shared traits of Pisdeli, Seh Gabi, and RWB painted wares: predominantly globular bowls and wide-mouthed pots; fine chaff temper; black painted simple geometric designs in a single register below the rim bordered by horizontal lines or a solid band on a white to whitish buff background (Renette & Mohammadi Ghasrian 2020). Together, these constitute a distinct, widely shared ceramic tradition in the northern and central Zagros, even though the technical execution and manufacturing process differs significantly between the different intermontane valleys. Based on a combination of radiocarbon dates from Pisdeli Tepe and Seh Gabi (Renette & Mohammadi Ghasrian 2020: Fig. 5), as well as stylistic parallels with Mesopotamian sequences, this tradition can be dated to be broadly contemporary with LC1, even if absolute dates can still only be vaguely defined to ca. 4600-4200 BCE or perhaps as late as 4000 BCE, which could overlap with the end of the late 'Ubaid tradition

and the beginning of LC2 in northern Mesopotamia. The presence of BOR ware could provide additional support for an LC1 date since a widespread, general BOR production, with highly localized stylistic variations, was produced from the Upper Tigris region to northeastern Iran, possibly reflecting interaction along a major exchange route (Abu Jayyab 2019: 187-192; Abedi et al. 2015: Fig. 9; Fazeli Nashli et al. 2005; Fazeli Nashli et al. 2021; Henrickson 1986: 126; Wong et al. 2010).[17] Finally, the spouted hole-mouth jar and the S-walled cup find good parallels in the Godin VII assemblages from Seh Gabi and Godin Tepe (Levine & Young 1987: 33-35; Young & Levine 1974: Fig. 13:6 and Fig. 13:8),[18] while the internally beveled rim bowl has good parallels in northern Mesopotamia (e.g. at Kani Shaie: Renette et al. 2021: Fig. 9:6). Their presence could support a date for the occupation at Chogha Maran into early LC2.

Early Chalcolithic (ca. 5100-4600 BCE) (Op. 300: 4-5)

The Early Chalcolithic (ca. 5100-4600 BCE) in the Zagros is typically associated with the Dalma pottery tradition that dominated assemblages from sites to the east of the central, northwest-southeast range of the Kuh-i Garin (Fazeli Nashli et al. 2021; Hamlin 1975; Renette in press a; Tonoike 2010; 2012). However, distinct Dalma painted ware is largely absent from the Mahidasht region. At Tepe Siahbid, the Mahidasht project team documented the local material culture of this period in greater detail, revealing a local variant of the widespread Black-on-Buff (“’Ubaid-related”) tradition of Mesopotamia and southwest Iran (Henrickson 1985: 70-73). At Chogha Maran, this material characterizes strata 4-5 in operation 300, where it was only explored in a small test trench.[19] BOB sherds constitute

[17] This includes so-called “Sprig Ware” in the eastern Jezirah (Abu Jayyab 2019: 187-192) and the Black-on-Red wares of the Transitional Chalcolithic II period in the central Iranian Plateau chronology, which remains poorly documented but is present in the latest levels at Chesmeh Ali and the earliest levels of Tepe Ghabristan (Fazeli et al. 2005). This technological practice possibly finds its origins on the Iranian Plateau where Black-on-Red wares were in use during the late 6th and 5th millennium BCE (Late Neolithic and Transitional Chalcolitic I-II).

[18] The pottery notes also make mention of the presence of so-called “S ware” in these levels at Chogha Maran, which is characteristic for the Godin VII period (Levine & Young 1987: 33).

[19] Total recorded sherds per stratum: Op. 300: 182 sherds from stratum 4, 217 sherds from stratum 5.

ca. 20% of this assemblage in these levels. Closely associated with this material are DUP (almost 10% in stratum 4), Dalma Impressed ware (5% in stratum 4), and Dalma Red-Slipped ware (20% in stratum 5). Plain, reddish (and few buff), chaff-tempered ware is dominant, although less so than in the later Chalcolithic and EBA levels, making up ca. 30% of the assemblage, while MF grit ware constitutes ca. 2% of the assemblage. In stratum 4, RWB (and WWR) sherds still form up to 20% of the assemblage, indicating that this might have been a transitional phase. In stratum 5, this material is no longer present and instead earlier J ware sherds form ca. 10% of the assemblage and earlier red-slipped ware ca. 5%.

Only few sherds from these lower strata were drawn as these earlier traditions were documented mainly at Tepe Siahbid, which remains unpublished. Therefore, based on the Chogha Maran data, it is not possible to discuss the functional assemblages in detail. The documented open shapes contain mainly conical bowls (Pl. 17:3-16). Plain conical bowls with a single painted band on the rim, which are very similar to RWB conical bowls, form the majority, but also common are deeper bowls that have more elaborate designs. Geometric designs are typical, but at least one vessel contains a bird motif (Pl. 17:12). The most commonly attested motif in the documented vessels consists of large zigzags, either horizontal or vertical (Pl. 17:1-3). The closed vessels consist of everted-rim jars and holemouth jars that have either horizontal bands below the exterior rim or a single register (Pl. 18:6-15). In addition, one vessel shows close similarities to Dalma Painted ware, but is executed in BOB ware (Pl. 18:5). Finally, a few Dalma Impressed ware jars were also documented (Pl. 18:1-4).

Dalma Impressed ware and DUP ("Dalma Untempered Ware"), which was a painted variant identified at Seh Gabi within its Dalma assemblage, occur almost exclusively in stratum 4 of operation 300, while so-called Dalma Red-Slipped ware is restricted to stratum 5. The technical description of DUP as a 'fine red ware' invokes RWB and can perhaps be interpreted as part of the gradual transition from buff wares (BOB phase) to red wares (RWB phase). Considering the continuity in shapes and decoration between stratum 4 and the following RWB-dominated strata 2-3, the occurrence of a significant amount of J ware sherds in stratum 5, and the distinction in frequencies between stratum 4 and stratum 5, we propose that there might have been a hiatus between these levels. Stratum 4 might be

considered chronologically as a transition from the BOB phase to the RWB phase, contemporary with the latter part of the Dalma period (ca. 4800-4600 BCE), while stratum 5 is at the beginning of the early Chalcolithic (ca. 5100-4800 BCE) and possibly a transition from the preceding Late Neolithic. Only new fieldwork and additional data will be able to clarify the chronology of the early occupation at Chogha Maran.

Late Neolithic (ca. 5400-5100 BCE) (Op. 300: 6)

The pottery from the lowest level reached at Chogha Maran again shows a marked change.[20] While BOB sherds still form ca. 20% of the assemblage (although poor stratigraphic control could have mixed material from different deposits), J ware now exceeds it slightly at 23%. Dalma Red-Slipped is still present, but only at 4%, while M-F chaff ware is still dominant at ca. 40%, but now the buff-colored variant constitutes a quarter of this chaff-tempered plain ware, which is significantly higher than in the later levels. Based on this limited data, we interpret stratum 6 as a slightly earlier level than stratum 5 within the transition from an underlying, unexcavated settlement of the Late Neolithic, which is characterized by the J ware tradition.

J ware was defined mainly at Tepe Siahbid (Henrickson 1985: 69; Levine & Young 1987: 19-21). The few documented sherds from Chogha Maran show the polychromy that is typical for this ware (Pl. 19:1-5). The majority of J ware sherds have very simple decoration with a painted black or white line on a solid painted background (in ranges of dark red, brown, or black). Two sherds show a more elaborate geometric design that combines thick red bands with thin black and white lines (Pl. 19:1,3). Stylistically, J ware shows parallels with late Halaf pottery in Mesopotamia, with which it is almost certainly contemporary (Henrickson 1986: 89-90; Sharp & Kaercher 2018; and O. Nieuwenhuyse pers. comm.).

5. Lithics

While the short unpublished summary of the soundings at Chogha Maran states that small finds included ‘the usual amount’ of lithics, there are no records of these in the archive, with the only exception of six small,

[20] Total recorded sherds per stratum: Op. 300: 193 sherds from stratum 6.

worked bits of obsidian flakes (Pl. 20:1-6). Five of these were retrieved from LC1-2 contexts (Op. 100 str. 10-11 and the mixed str. 7; Op. 300 str. 1f/2). These consist of broken pieces of bladelets with trapezoidal section, retouched flakes, and a thin perforator. One piece, a small burin, comes from one of the EBA trash deposits (Op. 300 str. 1c).

6. Worked bone

A total of six objects of worked bone were drawn and recorded (Pl. 20:7-12). Four of these were found in the EBA stratum 4b of operation 100 (three in the fill of rooms, one from a trash deposit). These include three pieces of worked long bones, at least one of which is a cattle bone. The fourth piece is a small, delicately worked ornament (possibly a button). A fifth piece, found in an EBA trash deposit in operation 300 is a worked caprid bone. The sixth piece is a polished tube that was found in an LC1-2 context in operation 100.

7. Metal

Most of the metal finds were found in Iron Age burial 4 in operation 100 (Pl. 21; iron weapons and jewelry; bronze bowls). One other Iron Age child burial in operation 300 included several iron bracelets (Pl. 22:5). Additional iron finds, including blade fragments and pieces of an iron bracelet, were found out of context, but possibly come from disturbed or unrecognized burials (Pl. 22:2-4). A piece of an iron sickle (Pl. 22:1) and a copper coin with an Arabic inscription (not drawn) were found in the uppermost level (stratum 2) of operation 100, which produced Middle Islamic pottery (none drawn).

No metal was found in the EBA levels, but the lower Chalcolithic levels did produce small pieces of copper. One fragment was found in an LC1-2 context in operation 100 (str. 11), while the unpublished short excavations summary mentions that in the lower Chalcolithic levels of operation 300 (strata 4-5), dated to the Early Chalcolithic (characterized by BOB), the excavators found “a few scraps of copper and a crucible fragment”. No additional information or drawings of these finds are currently available. Still, this is significant as it is evidence for early metallurgy during the first centuries of the fifth millennium BCE in the central Zagros.

8. Worked stone objects

Fourteen worked stone objects were recorded (with additional small stone objects classified as tokens; see below). Two of these are EBA stone vessels (Pl. 23:1-2), one of which is a small fragment of a carved chlorite vessel, which most likely finds its origins in the southern Iranian province of Kerman (Kohl 2001; Madjidzadeh 2003; Madjidzadeh & Pittman 2008). Six objects are classified as 'worked stone' (Pl. 23:3-8), which include whetstones, rubbing stones, a quern fragment (Pl. 23:6), and a grinding stone fragment (Pl. 23:8), while seven objects are labeled as 'ground stones' (Pl. 24), consisting of rubbing stones, a possible weight (perforated stone), and a mortar. Most of these recorded objects were retrieved from EBA contexts or the EBA trash dumps. From the Early Chalcolithic contexts in operation 300, only a smoothed 'rubbing stone' was recorded (Pl. 23:7), while from the LC1-2 contexts, the records list another 'rubbing stone' (Pl. 24:4) and a perforated stone (Pl. 24:7).

9. Spindle whorls

Only few spindle whorls were found in the soundings at Chogha Maran. Two baked clay, conical spindle whorls come from LC1-2 contexts (Pl. 25:1-2). In the EBA contexts, no typical spindle whorls were found, but two baked clay objects – so-called "wheels" – could have fulfilled such a function (Pl. 25:3-4).

10. Beads

Several small objects can be tentatively identified as beads that were either strung on a cord or sown onto textile. One blue glazed bead (probably a reworked piece of pottery) was found in the upper levels in operation 100 (Pl. 25:5) and should probably be dated to the Middle Islamic period occupation in this area. Another flat disk bead that was refashioned from a small piece of BOB painted pottery was found in an Early Chalcolithic context (Pl. 25:8).

Two flat disk beads, one limestone and one baked clay, were found in EBA contexts (Pl. 25:6-7), as was a limestone barrel bead (Pl. 25:9). Also from EBA contexts are two baked clay, cylindrical beads (Pl. 25:10-11), which find good parallels at contemporary sites in the Trans-Tigridian region (e.g. Kani Shaie: Renette et al. in press: Fig. 9i-l).

11. Administrative artifacts

The field records list 204 administrative artifacts, including 149 clay sealings,[21] one stamp stone seal, four intact and fragmentary baked clay and shell cylinder seals, and 50 clay tokens, all of which are accounted for at the National Museum of Iran in Tehran.[22] The vast majority of these objects were retrieved from the EBA trash deposits, but a few seals, sealings, and tokens were recovered from both Chalcolithic and EBA occupational contexts. This significant corpus of administrative artifacts is still a unique discovery in the central Zagros and highlights the importance of Chogha Maran as a local center, providing new insights in the socio-economic organization of late prehistoric societies in this region. Here we present a comprehensive analysis of this dataset, the results of which can be summarized as follows:

1. The seal impressions include a myriad of unique seal designs, which can be grouped into a limited set of styles, most of which are local to the central Zagros.
2. The sealings were used to secure both storage facilities (door/wall sealings) and movable containers.
3. Stylistic, functional, and stratigraphic analyses of the artifacts indicate local use and dump of the clay sealings as part of the administrative activities of a communal storage system in which a large number of people participated.
4. The glyptic evidence of Chogha Maran has close connections to Susa, the lower Diyala sites, and the Hamrin sites, as well as further north in the Trans-Tigridian region such as at Kani Shaie, Nineveh, and the Eski Mosul sites.

11.1 Seals

Initially identified as beads by the excavators, the shape, material, and the incised decorations on these objects, which in some cases match the geometric style of seal impressions, allow for an identification of these

[21] Previous publications made mention of ca. 200 clay sealings, but this count probably includes clay sealing fragments that did not have impressions and were discarded (Henrickson 1984: 709; 1985: 570; Pittman 2014: 368).

[22] Drawings of 67 sealings and a stone seal have been previously analyzed and published (Pittman 2014; Khayani & Niknami 2020a; 2020b).

objects as stamp and cylinder seals, or at the very least that they were occasionally used as such. These include one Chalcolithic stone stamp seal with a simple geometric design (Pl. 26:3) and four EBA cylinder seals made of baked clay and shell (Pl. 26:1-2,4-5). Except for an EBA seal retrieved from the mixed deposit at the top of the trench (Pl. 26:1), the findspots are consistent with the seals' chronological identification based on glyptic style. Three seals (Pl. 26:1-2,5) have good parallels within the Chogha Maran sealing corpus, as well as at sites in the Hamrin, the Diyala, at Susa, and at Ur.

The identification of baked clay seals confirms the hypothesis formulated by Pittman (2014) that the Chogha Maran corpus includes many impressions made with such seals. While baked clay seals have been found at numerous sites in Iraq and Iran (al-Gailani Werr 1988), they are usually rare. The observation that they were in common use at Chogha Maran suggests that they are a production typical of the central Zagros. Close stylistic parallels in the corpus of sealings from the Diyala, Susa, and southern Mesopotamia possibly attest to periodic interaction or the movement of individuals from the central Zagros region.

11.2 Clay Sealings

The 149 clay sealings with impressions contain 12 stamp seal impressions (Pls. 27-28) and 137 cylinder seal impressions (Pls. 29-43), respectively 8% and 92% of the total corpus. Here we present this material with a few modifications and additions of the typology proposed elsewhere (Khayani & Niknami 2020a; 2020b), made possible with the availability and comprehensive analysis of the complete corpus rather than a subset.

The obverse of the clay sealings usually bear a single seal impression, but in rare instances, more than one seal impression is present (Pl. 44). This practice is more common among the stamp seal impressions (Pl. 27:1-2,6-7, Pl. 28:10) than the cylinder seal impressions (Pl. 29:3, Pl. 33:4), probably because rolling a cylinder on the clay covers more surface than a stamp seal, which needs to be stamped on the clay multiple times in order to cover the sealing's entire surface. This is the case especially with the sealings that bear multiple impressions of the same seal (Pl. 44:1,4-5). Only two sealings bear impressions of different stamp seals (Pl. 27:4; 28:3; 44:3), which must have had practical reasons and a specific administrative function with more than one person, authority, or section of the

administration being responsible for the transaction (Dittmann 1986; Matthews 1993: 17; Zettler 2007: 351-358). Two clay sealings that have more than one cylinder seal impression have two perpendicular surfaces (Pl. 44:2; 45:8), which could not be sealed with a single rolling. Of these two sealings, one was sealed by two different seals (Pl. 44:2).

Glyptic styles

A. Stamp seal impressions

The stamp seal impressions can be organized into three types of seals (Table 3). Type 1, which combines a range of seal shapes with geometric designs, including the so-called 'Luristan cross' (a cross with chevrons filling the space between the arms; Caldwell 1976) (Pl. 27, Pl. 28:1). These are representative of a widespread Chalcolithic glyptic tradition throughout Iran with well-documented parallels at Susa I, Farukhabad (Farukh phase), Gawra XII-XI, Dehsavar, Seh Gabi VII, Giyan, Sialk III:6, and Hissar IC. Type 2, which consists of a round seal with an abstract horned animal motif (Pl. 28:3), finds parallels mainly at Susa I and Tepe Giyan in southwestern Iran.[23] Type 3 consists of miscellaneous impressions for which no immediate parallel could be identified. All these stamp seal types can be dated to LC1-2, confirming the chronological assessment of operation 300 strata 2-3 based on ceramic parallels. Three sealings (Pl. 27:2,4; 28:3) were retrieved from secure EBA trash deposits, while a fourth sealing (Pl. 27:1; 44:5) that was found in the fill of Iron Age Burial 4 in operation 100 is a wall sealing, which is a practice closely associated with the EBA period at Chogha Maran (see below).[24] As already pointed out by Pittman (2014: 51), these four sealings most likely represent a practice of occasional reuse of much older seals. Certainly, such

[23] Two fragmentary seal impressions of this Type 2 were also recently found at Kani Shaie in LC2 contexts (Renette 2018: Fig. V.13; Renette, in press b: Fig. 2).

[24] Another sealing with stamp impression (Pl. 27:3) was most likely a wall sealing as well. This sealing was found in a context that has been assigned to operation 300 stratum 2, but could have easily come from the EBA trash deposit immediately overlying it as well. In contrast, a bag sealing (Pl. 28:2) is from a context that is assigned to the lowest EBA trash deposit, but material from this context is mixed with the uppermost Chalcolithic context. One receipt sealing (Pl. 27:5) comes from operation 100 stratum 7, which contains large numbers of Chalcolithic pottery and most likely represents a deliberate deposit of earlier material to level the area.

stamp seals were readily available to the EBA inhabitants of the site who could have found them either on the surface or when digging into the mound.

B. Cylinder seal impressions

Of the 137 clay sealings bearing cylinder seal impressions, 106 sealings have identifiable seal impressions and 31 sealings are illegible. The identified seal impressions can be organized into four broad categories (Khayani & Niknami 2020b): a local Chogha Maran style (63%) (CMS, Pls. 29-36), glazed steatite style (23%) (GSS, Pls. 39-40), interlocking style (11%) (ILS, Pls. 37-38), and miscellaneous (3%) (MISC, Pl. 41:1-3).

CMS seal impressions are defined by simple, linear drawings that were probably made with baked clay seals. This style contains four major motifs: animal motifs (48%) (Pls. 29-32); anthropomorphic motifs (15%) (Pl. 33); concentric and rayed circles (25%) (Pls. 34-35); and square boxes filled with geometric motifs or one of the previous motifs (12%) (Pl. 36).

Within these four styles, we identify sixteen types of motifs (Table 3). The greatest variety of motifs is visible in the CMS (Type 1-11), which supports our hypothesis that this style is indigenous to the central Zagros and locally produced at Chogha Maran and its wider region. Except for motif type 4 and 6, these motifs and the general CMS style has widespread parallels in the glyptic record ranging as far as the southern Levant to eastern Iran, but with a concentration in the Trans-Tigridian region, the Zagros, and Susa. This matches closely the distribution pattern of the widely used GSS, which is also concentrated in the Trans-Tigridian region (Pittman 1994). While the CMS, currently only based on the evidence from Chogha Maran itself, seems to be a central Zagros production that circulated (or was carried by traveling individuals) throughout the Trans-Tigridian region and occasionally beyond, the GSS is almost certainly a Trans-Tigridian production that circulated more frequently than CMS westward into Mesopotamia (and as far west as Anatolia and the Levant) and eastward into Iran. Finally, the ILS is known best from Susa from levels that immediately postdate the Proto-Elamite period, but it has also been found in southern Mesopotamia, especially in the Seal Impressions Strata at Ur (Amiet 1972: Pls. 25-26; Porada 1993).

Table 3 – Stamp and cylinder seal design types at Chogha Maran.

glyptic style	motif type	motif description	Plate number	parallels
stamp seals				
	Type 1	round, rectangular, or triangular seals with geometric designs	Pls. 27; 28:1	**Susa I**, **Tepe Gawra**, **Dehsavar**, **Seh Gabi**, **Tepe Giyan**, **Tepe Sialk III:6**, **Tepe Hissar IC**
	Type 2	round seals with horned animal motif	Pl. 28:3	**Tepe Giyan**: Caldwell 1976: 100, 103-104 **Susa I**: Amiet 1973: Pl. 2:1
	Type 3	round or rectangular seals with miscellaneous designs	Pl. 28:2,4-5	none found
cylinder seals				
CMS	Type 1	individual animals	Pls. 29:1-11; 45:2; 49:3	**Kani Shaie:** Renette 2018: Fig. V.61b-c **Ahmad al-Hattu**: Sürenhagen 2011: Fig. 20.1
	Type 2	combination of animals	Pls. 30:1-4,6; 31:5,6,9; 45:2; 49:8; 50:5	**Kish**: Buchanan 1966: Pl. 6.80 **Southern Levant**: Ben-Tor 1978: Fig. 6.42 **Varzaneh (Isfahan)**: Rafi'i Alavi et al. 2021: Fig. 6
	Type 3	animals combined with symbols	Pls. 31:1-4; 32:3-5	**Khafajah Sin IV-VI**: Frankfort 1955: Pl. 9:72, Pl. 23:233 **Susa:** Delaporte 1920: Pl. 24:10 **Tell Gubba VII:** Ii 1988: Fig. 6.6
	Type 4	laden animals (carrying things)? (animal + abstract motif)	Pls. 30:5,7; 31:8; 32:1-2	none found
	Type 5	human stick figures with exaggerated features	Pls. 33:1,3; 45:1	**Susa**: Legrain 1921: Pl. 25:230
	Type 6	leaping human stick figures	Pls. 33:2; 50:9	none found
	Type 7	human stick figures with a raised hand and male genitals	Pls. 33:4-5; 44:2	**Susa**: Legrain 1921: Pl. 13:210
	Type 8	human stick figures with two upraised arms	Pl. 33:6-10	**Tell Suleimeh**: al-Gailani Werr 1988: Fig. 3.10, 17, 19-20 **Tell Kutan**: Pittman 2019: Pl. 10.2:6 **Nineveh**: Pittman 2019: Pl. 10.5:9

CMS	Type 9	concentric circles (or rarely rectangles)	Pls. 34; 35:1-3; 45:3; 50:10	**Susa:** Delaporte 1920: Pl. 17:4; Legrain 1921: Pl. 2:25; Amiet 1972: Pl. 21:806, 832, 878 **Tell Gubba IV-VII**: Ii 1988: Fig. 7.24, Fig. 13.112,114-116 **Khafajah**: Frankfort 1955: Pl. 36: 376, Pl. 39:407, 410 **Tello**: Amiet 1980: Pl. 21:357 **Fara**: Martin 1988: n.129 **Southern Levant**: Ben-Tor 1978: Fig. 1.1, Fig. 2.12,15, Fig. 3.20, Fig. 4.24; Joffe 2001: Fig. 19.2:2; Braun 2004: Fig. 4.1 **Shahr-i Sokhta**: Amiet 1983: Fig. 1f, Fig. 15
	Type 10	rayed circles containig a small dot	Pl. 35:4-7	**Susa**: Legrain 1921: Pl. 15:230 **Southern Mesopotamia**: Buchanan 1981: n.227
	Type 11	square box filled with type 8, 9, or 10 motifs or geometric designs	Pls. 36; 50:7	**Tell Kutan**: Pittman 2019: Pl. 10.2:6 **Southern Mesopotamia**: Buchanan 1981: n.227
ILS	Type 12	geometric interlocking designs	Pls. 37:1-4; 38:2-3,6; 49:6; 50:11	**Susa**: Carter 1980: Fig. 17.1; Amiet 1972: Pl. 25:1021, Pl. 26:1051, 1076
	Type 13	interlocking animals	Pls. 38:1,4-5,7; 49:5; 50:1,8	
GSS	Type 14	hatched geometric shapes	Pls. 39:1-8, 10-11,13-15; 40:1-3; 50:2	**Susa**: Delaporte 1920: Pl. 13:4, 6, Pl. 15:7, 12, Pl. 16:17; Carter 1980: Fig. 17.7 **Diyala**: Frankfort 1955: Pl. 21:217, Pl. 82:869
	Type 15	multiple element geometric designs	Pls. 39:9,12,14; 40:4-10; 49:1; 50:4	**Tell Gubba III-VII**: Ii 1988: Fig. 8.37, Fig. 9.44, Fig. 12.96-98, Fig. 23 **Nineveh**: Pittman 2019: Pl. 10.9:7 **Tell Mohammad Arab**: Pittman 2019: Pl. 10.12:6 **Ur**: Legrain 1936: nos. 26, 138 **Southern Levant**: Ben-Tor 1978: Fig. 1.8-9, Fig. 2.12, Fig. 3.20, Fig. 4.24-25; Braun 2004: Fig. 6.5
MISC	Type 16	miscellaneous	Pl. 41:1-3	**Susa**: Delaporte 1920: Pl. 13:20 **Southern Levant**: Ben-Tor 1978: Pl. 1:5-6

Functions

Unfortunately, the clay sealings from Chogha Maran are usually small and fragmentary since they were discarded, broken fragments that were dumped together with other trash on the side of the mound. As a result, reconstructing their original function can be very difficult and often impossible. Furthermore, many are flat sealings with a smooth or an irregular reverse lacking any identifiable object or cord imprint that typically allows a reconstruction of function. Out of a total of 149, the function could be reliably identified for only 82 sealings. These include: wall sealings (42%); jar sealings (33%); bag sealings (7%); door sealings (7%); receipts (6%); basket sealings or sealings attached to basket lids (4%); and box sealings (1%).

A. Container sealings

The container sealings consist mostly of jar sealings, while bag sealings, basket sealings, and box sealings also occur, but are rare. Four different types of jar sealings can be identified, based on the shape of the clay sealing fragment and/or a smooth reverse where the clay was pressed against the exterior of a ceramic vessel. The precise application of these sealings on the vessels and their covers or lids is often difficult to reconstruct in detail, but Table 4 offers hypothetical interpretations and parallels from other studies that had access to a larger, better-preserved sealing corpus. In a few cases (Pl. 38:1, 40:7, 43:10), typical jar sealings (Type 1 & 2) were preserved enough to reconstruct the diameter of the vessel's rim, all of which give a range of ca. 12-14cm, which fits well with the smaller everted rim jars, some of which have applied lugs, that were found in the same contexts as the clay sealings.

At least for some of the sealings, the ceramic vessel appears to have been closed with a lid. While often these lids may have been made from perishable materials (wood; wicker), sherds from ceramic lids were also found at Chogha Maran. The type 4 jar sealing is only represented by a single sealing, which is oddly flat yet had been attached against a ceramic vessel and it has a hollow depression along one edge. We suggest a scenario that this sealing secured a ceramic lid, the rim of which caused the hollow depression. Possibly, the sealing secured a so-called "slosh-proof jar" with the slab of clay pressed against the straight inner ledge, and the edge of a flat lid, possibly extending over the rim as well (Pl. 48:2).

B. Immobile entrance sealings

Clay sealings that were attached directly to storage facilities occur in two types: door sealings and wall sealings (Table 4). Securely identified, typical door sealings are rare in the Chogha Maran corpus, but wall sealings were the most common group, which is especially relevant considering that such sealings would have been used for longer term storage of a single room (or storage facility entrance). Such wall sealings were imbedded in the plaster, "kahgel" (Persian: literally "straw-clay"), that was applied to seal a closed-up doorway, thereby securely closing off an internal space that did not need to be accessed for a long time. This practice of long-term storage of goods rather than the storage of vessels within a room with a sealed door that can be repeatedly accessed (cf. Amiet 1971: 223) was identified by Pittman (1994: 54-56; 1997: 138) in her study of Proto-Elamite administrative artifacts. If our identifications are correct, wall sealings are the most common type at Chogha Maran, which has significant implications for the organization of storage at the site.[25]

C. Receipt sealings

These are thick masses of clay that are oval, square, or hexagonal (?) in shape, usually with a raised part in the middle bearing the impression of one or more stamp seal impressions of the same seal or different seals on the obverse and without any traces of cord or any object imprints on the flat and mostly smooth reverse. These sealings might have acted as a type of receipt for a transaction (Alizadeh 1994: 39; 2006: 86). The shape might be connected to the type of the transaction, and the seal impression with the person in charge of it. This type of sealing practice was in use only during the Chalcolithic.

Seal design-function correlation and frequency of seal use

As Table 5 shows, there is very little direct correlation between seal types and sealing functions. Instead, every type of seal was in use at the

[25] Pittman (1997: 138) has argued that alternative explanations as labels, calling cards, practice rollings, or reference rollings are less convincing since they fail to explain the presence of plaster and plaster imprints on the sealing reverse, which clearly indicates they were attached to walls.

site itself and for different purposes.[26] Correlation between specific seal designs and sealed objects can provide vital data on the areas of individual or collective administrative authority and informs us about the actors and their responsibilities within an administrative system (Zettler 2007: 344). In Proto-Elamite administration, seals were often repeatedly used to seal both wall and door sealings, which implies the presence of an administrative office with the authority over storage and distribution of goods (Pittman 1994: 55; Pittman 1997). At Chogha Maran, numerous distinct seals were in use and none of them were used more than once within the available corpus. This implies that, at EBA Chogha Maran, administrative responsibility was shared collectively among the community with many people or families involved in a communal storage organization. Without direct evidence for imports at the site,[27] it is safe to assume that the actors responsible for the sealings were present at the site for at least part of the year. The mobile containers were either in use and sealed at Chogha Maran or at the very least they could have been produced and sealed within the immediate region of Chogha Maran and brought to the site, which might have functioned as a local center.

Cords used to bind containers and door pegs

The cords used at Chogha Maran to bind different objects have left at least three distinctive types of imprints on the reverse of the clay sealings: imprints of twisted cords (Pl. 49:4-6,8); unclear imprints of irregular, twisted, hairy cords (Pl. 49:3); and smooth, tabular imprints of smooth cords (Pl. 49:1-2). 54 cord imprints have been identified on the back of 53 sealings. Of these, 41 are S/Z-twisted cords (76%), while the rest is either unidentifiable or smooth, which are possibly imprints of smooth, plaited cords produced with closely and tightly interlocked wool yarns with a netted texture (Laurito 2007: 384).

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[26] Only receipts are closely correlated with stamp seal impressions, but all sealings of this type can be associated with the Chalcolithic period occupation when stamp seals were produced. ILS style seals were used almost exclusively on container sealings (with a single exception of a wall sealing), possibly representative of imports since this is not a local glyptic style.

[27] Given the small amount of Scarlet Ware and Godin III painted sherds at the site, it is possible that these represent imports from neighbouring regions, but such a scenario would need to be verified through clay sourcing analysis.

Table 4 – Functional types of clay sealings at Chogha Maran.

		sealing fragment description	functional interpretation	plate	parallels
A. container sealings					
jar sealings	Type 1	clay sealing with imprints of cords and textile/leather folds on reverse; sealing with the shape of jar neck	common jar sealing: clay attached on a cord, which was wrapped around the neck of the vessel to secure a fabric cover (cloth or leather) that covered the vessel mouth	Pls. 45:2,4,6; 49:4-6,8; 50:1,4-9	Zettler 1987: Fig. 11; 1989: Fig. 49-50; Matthews 1993: Fig. 28c; Ferioli & Fiandra 2007, Fig. 11.14 & 11.15
	Type 2	clay sealing with smooth reverse surface; sealing with the shape of jar neck and/or rim	clay extended from neck, over the rim, and covering part of a lid (ceramic; wooden; wicker), without fabric cover	Pls. 45:5,7; 48:1	Matthews 1993: Fig. 28b; Ferioli & Fiandra 2007: Fig. 11.66,1
	Type 3	clay sealing with smooth reverse surface and imprints of cords; sealing with the shape of jar neck	clay attached on a cord, which was extended over the vessel mouth to secure a lid and wrapped around the neck, possibly through the hole of a lug or handle	Pls. 45:1; 48:3	
	Type 4	flat sealing with smooth reverse and smooth, hollow imprint at one edge	clay attached against ceramic surface, probably extending over the vessel rim (broken) and against the edge of a ceramic lid	Pls. 45:3; 48:2	
bag sealings		very irregular reverse surface with imprints of fabric folds (leather or textile) and cords	clay wrapped around narrow neck of a bag that was tied with a cord	Pls. 46:3-4; 50:10,12	Zettler 1987: Fig. 12; Matthews 1991: Fig. 3
basket sealings		imprints of wickerwork on reverse (reeds or strips of bark), sometimes with cord imprints	clay attached on a cord that passed through the body or lid of a basket; or clay attached to a wicker lid used to close a jar, either secured by a cord or with a slab of clay extending over the rim and lid	Pl. 46:1-2	Matthews 1993: Fig. 29b; Ferioli & Fiandra 2007: Figs. 11.18-11.20

box sealings		clay sealing with two perpendicular surfaces at a right angle, sometimes with imprints of fabric folds (leather)	clay attached on the sharp edge of a box (probably wood) and extending over the lid, sometimes wrapped in leather	Pl. 45:8	
B. immobile entrance sealings					
door sealings	Type 1	cone-shaped clay sealing with a flat base and a round imprint of cords on the side edge	common door peg sealing: clay attached in the corner formed by a wall and a peg, against a cord that was wrapped around the peg and through a hole in the door	Pl. 47:1	Matthews 1993: Fig. 27; Ferioli & Fiandra 2007: Fig. 11.22 & 11.26
	Type 2	cone-shaped clay sealing with a flat base and a round imprint of a peg on the side edge, without cord imprint and with imprint of wooden texture	clay attached against a wooden hook that was used to wrap around the peg	Pl. 47:2	Zettler 1987: Fig. 3-4
wall sealings		smoothed, thin & flat slabs of clay (oval or square) with mud plaster or plaster imprints on the reverse with lots of chaff ("kahgel"); upper edge more smooth and different color than reverse	wall lock that was attached into the plaster of a sealed-up door (with bricks and plaster)	Pl. 47:3-6	Pittman 1994: 54-56; 1997: 138
C. receipt sealings					
		thick mass of clay (oval, square, hexagonal) usually with a raised part in the middle that is impressed with one or more stamp seals	receipt for a transaction	Pl. 46:5-8	Alizadeh 1994: 39, Fig. 11.A-C; 2006: 86, Fig. 74a

Table 5 – Correlation table of seal types and sealing functions.

glyptic style	motif type	function						
		wall sealing	door sealing	jar sealing	bag sealing	box sealing	basket sealing	receipt
stamp seals								
	Type 1	3	1	-	-	-	-	4
	Type 2	-	-	1	-	-	-	-
	Type 3	-	-	-	1	-	-	-
cylinder seals								
CMS	Type 1	2	-	3	-	1	-	-
	Type 2	1	-	6	1	-	1	-
	Type 3	5	-	-	-	-	-	-
	Type 4	4	-	-	-	-	-	-
	Type 5	1	-	1	-	-	-	-
	Type 6	-	-	1	-	-	-	-
	Type 7	1	-	-	-	-	-	-
	Type 8	-	-	3	-	-	-	-
	Type 9	6	2	1	1	-	-	-
	Type 10	-	-	-	-	-	-	-
	Type 11	2	2	2	1	-	-	-
ILS	Type 12	1	-	1	2	-	-	-
	Type 13	-	-	3	-	-	-	-
GSS	Type 14	3	1	1	-	-	-	(1?)
	Type 15	3	-	3	-	-	-	-
MISC	Type 16	-	-	-	-	-	-	-
total		32	6	26	6	1	2	5

Of the identified twisted cords, 25 are of the Z-twist type (61%) and 16 are S-twists (39%). In one instance, both Z-twist and S-twist cords were used (Pl. 45:2).[28] They occur in both 2-3 mm or 5-6 mm thickness, although

[28] At Arslantepe, the use of different types of cord has been argued to reflect different authorities (Laurito 2007).

the 2-3 mm ones are most common (88% of the Z-twists and 62% of the S-twists). Since in many cases the twisted cords show imprints of hairs, they were most likely produced from wool and animal hairs (Pls. 45:1; 46:3; 47:1; 48:3). However, there are some cases with clear, neat imprints, which could be from flax yarns (Pls. 45:6; 46:4; 49:4). This pattern fits R. Matthews' (1993: 37) suggestion that Z-twists are more often made from goat hair yarns and S-twists from flax yarns, supporting our interpretation that animal hair fibers formed the dominant resource for cord production at Chogha Maran.

Surprisingly, with the sole exception of 153-31 (Pl. 49:7), none of the sealings have the imprint of a knot. This is not due to lack of preservation, since even those sealings that are almost intact lack knots as well (Pls. 45:4; 49:5,8). Instead, most sealings have more than one winding of the cord imprinted on their back, which suggests that rather than using knots, cords were either tucked or half knotted (Pl. 49:6,8). Based on similar observations of the Arslantepe sealings, R. Laurito (2007: 390) suggested that the act of sealing would have taken place during a short period of time. The containers and other objects sealed in this way might have not traveled far away (staying within the same site or immediate surrounding) and it was probably not the knot that secured the stored goods from unauthorized access, but rather the sealing itself that guaranteed the goods from unallowed interferences.

Covers used to close containers

Other studies have convincingly argued that there is a relationship between the material used to seal a container and its content. For example, leather, which prevents evaporation and leaks, or ceramic lids are more effective for containers that contain liquids, while cloth and wicker, which allow airflow, work better for containers with cereals (Laurito 2007: 390). At Chogha Maran, leather covers and ceramic lids are the most frequently used to cover containers, which implies an emphasis on the storage of liquids rather than solid materials. This is further supported by the larger number of jar sealings, the presence of actual ceramic lids at the site (more suitable covers for vessels containing liquids), the use of 'slosh-proof' jars and many carinated cups in the pottery assemblage of Chogha Maran (indicating storage and consumption of liquids), and the much smaller number of baskets and bags (more suitable for holding solid materials such as dried fruits and agricultural products). Of 29 identified sealings with imprints of

container covers, only three have cloth impressions (Pl. 50:1-3), while the rest most likely had leather covers (Pl. 50:4-11). Many of these leather covers look smoother than those of Arslantepe and the shape of the folds implies thick, smooth covers (see for instance Pl. 50:4-6,10; compare with Laurito 2007: Fig. V.5). In addition, as mentioned before, several sealings were placed directly against the body of the vessels, which means they would have secured pottery vessels with wooden, wicker, or more likely actual ceramic lids attested at the site (or bowls used as a lid) (Pl. 45:3,5,7). Therefore, the evidence strongly suggests that containers were predominantly used for storing liquids, possibly beer, wine, or oil, intended for later consumption at Chogha Maran. Bulk dry storage of cereals and other goods could have been done in large pithoi, bags, or bins inside storerooms that were locked by door and wall sealings, but without access to those contexts through excavation, it is not possible to reconstruct the contents of those rooms.

11.3 Tokens

Field records list fifty 'clay counters' from Chalcolithic contexts, almost all LC1-2, of which only seven representative specimens were drawn (Pl. 51:8). These are simple, small, clay spheres with a diameter between 1-2cm. The vast majority of these were found in a single hoard in operation 300 stratum 3a on a surface of a room that also contained complete vessels and many sherds, mixed with ash.

A heterogeneous group of objects, retrieved mainly from the EBA trash deposits mixed with the sealings, can be tentatively interpreted as tokens that were used in the administrative practices at Chogha Maran.[29] Eleven small, clay, geometric objects are stored at the National Museum of Iran, including disks, cones, biconoids, cylinders, and triangles, but lack drawings in the original records (Pl. 54). In addition, the field records list 36 clay objects, two stone objects (Pl. 51:9-10), and one bone object (Pl. 51:11), which we suggest could have been used as administrative objects alongside the sealing practices. These objects include small animal figurines (Pl. 53); clay and stone spheres (Pl. 51); clay oval, button-shaped

[29] While the majority of Chogha Maran tokens, and all animal figurines, were found in EBA contexts, at least three come from Chalcolithic contexts (Table 13:10,15,44). Since these do not differ from EBA tokens, it remains a distinct possibility that these were also EBA in date (intrusive or misidentified during excavation).

clay objects (Pl. 52:5-8); tusk-shaped or ring-shaped clay objects (Pl. 52:1-4); an oval slab of clay (Pl. 52:9); and a shell-shaped clay object (Pl. 52:10). While other uses for these objects can be hypothesized (e.g. sling balls, toys, personal decoration), we propose to include these in the token category due to their close contextual association with the clay sealings. Furthermore, they show close similarities to token types described at other sites (Schmandt-Besserat 1992). These small objects could have been used together with the sealing system to keep account of different commodities and track private property in a communal storage system. For example, small animal figurines (or just animal heads) depict goat, sheep, and possibly cattle, which is consistent with the faunal evidence and the iconography of EBA sealings for the main animals kept and consumed at Chogha Maran (see below). These figurines find good parallels at sites with occupation from the first half of the third millennium BCE in the Tigridian region (Tonussi 2019: Pl. 7.4). While their specific meaning cannot be reconstructed, it is possible that they symbolize herded and hunted animals of different breeds and ages.

The color, the paste, the firing, and surface treatment of the clay tokens vary. Some of the tokens are sun-dried, some partly or accidently fired, and others are well-fired. Likewise, some tokens have coarse clay and an irregular surface, while others have fine clay and a smooth surface. There were both plain and complex tokens at Chogha Maran. The complex tokens include biconoids with a hollow in the middle (Pl. 54:3-4) or an applique band with ladder pattern (Pl. 54:5), a perforated disk (Pl. 52:11), disks with simple incised or impressed marks (Pl. 54:1-2), and probably a clay shell, which resembles a hollow pendant but lacks a perforation (Pl. 52:10). Schmandt-Besserat proposed in a series of publications that clay objects labeled as tokens functioned as numerical tools in a widely used accounting system throughout Greater Mesopotamia between 8000-3000 BCE with each token shape representing a specific amount of a certain commodity (Schmandt-Besserat 1979: 24-25; 1981: 283; 1982: 875; 1986: 36; 1992). However, others have recently argued that these objects, especially in earlier periods, were multifunctional artifacts that were used for different purposes in various contexts, regions, and even sometimes within a single site (Bennison-Champan 2019). Still others emphasize that these objects have symbolic functions, possibly within a ritual context (Palka 2021). Whichever the case, the objects from Chogha Maran do not have enough contextual information to reconstruct their function or meaning,

but we consider it meaningful that they were produced frequently and in a wide range of shapes, and eventually deposited in conjunction with the clay sealings and a range of ceramic vessels.

12. Organic remains

The Mahidasht project employed sampling procedures during excavation that were relatively sophisticated at the time, including dry-screening at various sizes and flotation. S. Davis conducted analysis of the faunal remains (Davis 1984), while R. Dennell was responsible for the plant remains. While the unpublished reports make it clear that significant analytical work was planned to process the organic remains, final reports have remained unpublished and the botanical remains could not be exported in the chaos of the hasty departure from Iran in 1978.[30] In 1984, Davis published a brief overview of his work on animal bones from the different excavated sites, including Chogha Maran.[31] In this publication, Davis offers a preliminary overview of changes in the faunal assemblages in the central Zagros from the early Neolithic to the Iron Age. While the dataset is too small to allow for final conclusions, he was able to tentatively identify a few major developments that confirm earlier observations in the faunal record of the Mahidasht region in the context of Braidwood's Iranian Prehistory Project (Bökönyi 1977). In sum, an initial change occurred during the Neolithic when a subsistence pattern based on hunting, as evidenced by the dominance of gazelle and onager, shifted to one based on animal husbandry with a dominance of domesticated goat and sheep. A second change can be seen in the Chalcolithic faunal record when the number of cattle and pig bones increased at the same time as the age of slaughtered goat/sheep increased.[32] Following Davis, this indicates a possible change from herding goat/sheep for meat production in the Neolithic to the exploitation of their secondary products during the Chalcolithic. The increase of cattle and pig bones could reflect a growing reliance on these animals for meat, to compensate for a reduction in the consumption of

[30] R. Dennell pers. comm.

[31] Davis confirmed in personal communication that no additional data from Chogha Maran is available, so that his 1984 article should stand as a final report.

[32] In contrast, Bökönyi observed a consistently high ratio of adult sheep and goats, possibly indicating an early use of these animals for wool and milk already during the Neolithic (Bökönyi 1977: 16-25).

goat/sheep, which were instead raised primarily for milk and wool. The increase in cattle could also be related to their use as draught animals beginning at least in the Late Chalcolithic (Bökönyi 1977: 11). While Davis does not discuss the EBA record from Chogha Maran, he does include counts of animal bones (Davis 1984: Table 2), which show a possible change from the previous Chalcolithic husbandry pattern. While during the Chalcolithic, sheep bones were far more prevalent than goat (at a ratio of 3:11), in the EBA, this ratio reverted back to an equal balance of goat and sheep that was also visible during the Late Neolithic to Early Chalcolithic at Tepe Siahbid and Chogha Maran. At the same time, there is a small, yet significant increase in pig bones in the EBA levels, although still well below the number of cattle bones. Increases in pig consumption is often correlated with sedentary population growth and potential exclusion of part of the population from access to other meat sources (Price et al. 2017).

13. Discussion

Four weeks of excavations at Chogha Maran, focused on two small soundings, produced a substantial dataset that defines the late fifth millennium and early third millennium BCE cultural traditions and social organization in the western central Zagros. The combined stratigraphic sequence of operations 100 and 300, the ceramic assemblages, and the corpus of administrative artifacts document the growth of a local Chalcolithic center during the fifth millennium, followed by a long period of abandonment in the fourth millennium, and a renewed use of the site as a central town during the first half of the third millennium. The reasons for abandonment during LC2 (ca. 4000 BCE) are unknown, but this pattern has similarly been attested at other sites in the Zagros such as at Seh Gabi in the Kangavar Plain, at Pisdeli Tepe in the Ushnu-Solduz region, south of Lake Urmia, and possibly also at Chogha Gavaneh in Islamabad (Abdi 2002). By the end of the fifth millennium BCE, the Zagros region came increasingly under the influence of Mesopotamian and southwest Iranian cultural traditions, which can at the moment only be outlined cursorily in the ceramic production with the end of painted pottery styles and the widespread adoption of assemblages dominated by heavily chaff-tempered plain wares (Renette & Mohammadi Ghasrian 2020). This dramatic change in ceramic production, then, appears to have been accompanied with major

shifts in settlement patterns and the establishment of new demographic centers. While in the Kangavar Plain, the growing complexity of social organization during the LC2-5 (fourth millennium) can be traced at Godin Tepe, no such site has yet been explored through excavations in the Mahidasht region. However, the documentation of the Mahidasht Survey Project does suggest that population growth continued and became organized around several larger, strategically located centers (Henrickson 1994; Renette 2018: 315-320; Renette & Mohammadi Ghasrian 2020: 125), even if no good evidence has yet been identified for the Godin VI:1 period (equivalent to the Late Uruk and/or Proto-Elamite period). This pattern of sustained growth and eventual concentration of the population into a few larger settlements has also been observed by survey projects in valleys throughout Luristan (Goff 1971: 145; Mortensen 1974: 32-33; 1976: 45).

13.1 Early Chalcolithic (ca. 5100–4600 BCE)

The Chogha Maran excavations demonstrated that the site was inhabited at least since the Late Neolithic of the end of the sixth millennium BCE and remained inhabited into the Early Chalcolithic of the first half of the fifth millennium BCE. However, remains of these early periods are not documented in detail because they were explored mainly in the soundings at Tepe Siahbid. Based on pottery traditions, which form our only good evidence at present for the Early Chalcolithic in the Mahidasht, the western part of the central Zagros participated in a widespread horizon of black-on-buff painted pottery extending from western Mesopotamia to southern Iran (Henrickson 1989; Weeks et al. 2010).

These earliest levels at Chogha Maran produced only very few finds. The field records mention "a few scraps of copper and a crucible fragment" in the lower strata of operation 300. Such finds from the first half of the fifth millennium BCE are rare and attest to the earliest development of metallurgy on the Iranian Plateau (Matthews & Fazeli Nashli 2004; Roberts et al. 2009; Thornton 2009; Weeks 2012). Copper is not locally available in the Kermanshah region, which means that this metal was brought to the site from elsewhere and that such access to a non-locally available resource was common enough for a local skill in metallurgy to develop as evidenced by the presence of a crucible for metalworking and not just finished copper products. The unpublished summary of the

fieldwork also mentions the presence of bits of bitumen in the Early Chalcolithic levels, which lends further support to the interconnectedness of Chogha Maran in the interregional exchange networks of the fifth millennium BCE, since bitumen would have most likely reached the site from a source in the Trans-Tigridian region or Khuzestan (Connan & Van de Velde 2010).

13.2 Late Chalcolithic 1-2 (ca. 4600–4000 BCE)

By the middle of the fifth millennium BCE, the central Zagros black-on-buff pottery underwent both stylistic and technological changes. The dominant painted pottery of the second half of the fifth millennium is so-called Red, White, and Black ware (RWB). However, the general aesthetic of this pottery is still a simple, black painted design on a whitish background. Several vessel shapes and motifs remained in use, while possibly BOB pottery itself continued to be produced for some time still considering the relatively high percentage of BOB-labeled sherds from LC1-2 strata. The innovation was mainly technological. While BOB pottery was produced by applying black paint directly on the smoothed exterior of a buff-colored vessel, RWB had a reddish fabric with a white wash applied on both the exterior and interior to give it a whitish to buff appearance. Both traditions consisted for a large part of wide, conical bowls with a single black line painted on and extending just below the rim (Pls. 14 & 17). Both BOB and RWB closed vessels include jars with a pinched rim and a few painted bands (Pls. 15:2,5,8,9 & 18:14), but overall RWB jars are of a simpler shape with direct, plain rims and a wide mouth (to the point that some can be considered open vessels: Pls. 15:10-16 & 16:1-13). This change to an assemblage with large, wide-mouthed pots potentially indicates changes in commensal practices.

While the painted vessels generally continue the aesthetic preferences of the widespread black-on-buff tradition, and is possibly broadly related to the contemporary final 'Ubaid potting practices of southern Mesopotamia ('Ubaid 5), the LC1-2 plain wares from Chogha Maran (Pls. 12-13) find morphological parallels in the emerging potting traditions of northern Mesopotamia. These include mainly globular jars with a short, angular, everted rim (Pl. 13:5-8) and cooking jars with everted rim (Pl. 13:13-17). However, overall, this assemblage, which contains largely chaff-tempered

ceramics with a reddish fabric and a significant amount of red-slipped plain wares, is typical of the Chalcolithic Zagros. Similar assemblages of chaff-tempered, red plain wares and painted pottery with black designs on a whitish background are present at contemporary Seh Gabi and Pisdeli Tepe, although with significant local variations in technological practices. Such a variation is not surprising in a fragmented landscape such as the Zagros Mountains. Instead, the overall shared aesthetic expression in decorated pottery and morphological assemblages reflects a significant degree of shared cultural practices throughout the central and northern Zagros during this period.

These longer distance connections are also visible in other object categories, most notably in the sealing practices and glyptic designs. Stamp seals with carved designs that were widely distributed in western Iran and the central Iranian Plateau were also in common use at Chogha Maran. In only two small soundings, excavators retrieved a stamp seal and several sealings of this period. As villages grew larger through the Chalcolithic and possibly a few small central settlements emerged by the middle of the fifth millennium, such as Chogha Maran, control over goods, management of private property, and organization of communal storage became problems that required administrative solutions. Possibly such developments gave rise to increasing differentiation in prestige, wealth, and power (Alizadeh 1994; 2006). The discovery of a small piece of copper in these LC1-2 contexts indicates that the community participated in an interaction network through which such raw materials (and finished goods) were exchanged over long distances, even if this was merely down-the-line exchange rather than direct contact involving regular distant travel. Similarly, at least three pieces of obsidian tools were found in LC1-2 contexts, all of which could only have come from one of the main sources in eastern Anatolia or the southern Caucasus (Barge et al. 2018; Khalidi et al. 2016; Renfrew & Dixon 1976; Renfrew et al. 1966). Participation in these long-distance exchange networks is also reflected in the ceramic record with the appearance of small amounts of black-on-red painted pottery (Pl. 16:14-22), which is typical for northern Iran and was adopted during LC1 as far away as the Upper Tigris region. The mechanisms behind this spread of ceramic potting practices still require significant investigation, but a pattern is emerging that such a distribution matches the geographical range of exchange of highly valued commodities and raw materials, such as obsidian, metals, and semi-precious stones.

13.3 Early Bronze Age (ca. 3000–2500 BCE)

After a long hiatus spanning the entire fourth millennium BCE, during which time the region had become increasingly integrated within the Late Chalcolithic plain ware traditions that spanned Greater Mesopotamia, Chogha Maran was reoccupied during the early third millennium BCE. Somewhat unexpectedly, the characteristic ceramic assemblage of this EBA settlement displays a degree of continuity with earlier Chalcolithic traditions of the northern and central Zagros. This continuity was strong enough for excavators to originally mistake EBA pottery as Chalcolithic as they share the production of chaff-tempered, red-slipped pottery. However, the overall assemblage presents an innovation, including new vessel types, that reflect EBA cultural traditions.

Even though the Chogha Maran, and by extension the entire Mahidasht, EBA pottery is entirely distinct from the contemporary Kura-Araxes pottery that had spread into the eastern part of the central Zagros, there does appear to be a significant degree of influence visible with the application of high burnishing, the use of dark grey to black fabrics for certain vessels, and occasional decoration with white paste filled incisions (a feature typical of the southern Kura-Araxes pottery tradition, best known from Godin Tepe phase IV). While the shapes, consisting mainly of rounded bowls, everted rim jars, and small carinated cups, are completely different from the Kura-Araxes material documented at Godin Tepe IV, the Chogha Maran assemblage has a very similar functional range consisting mainly of individual consumption vessels and a few larger serving dishes (Rothman 2011: 172-174). As at Godin Tepe, large storage jars are virtually absent. In other words, the majority of the ceramic assemblage was most likely used in the context of food and liquid consumption. The only common large jar type is the so-called ‘slosh-proof’ jar, which has an inward projection of the rim, creating an inner ledge. These globular jars often had large handles. Their original content can only be determined through future analyses, but based on their shape, they were most likely used as large liquid containers, possibly of an alcoholic nature.

Of course, the most spectacular discovery at Chogha Maran are the clay sealings with cylinder seal impressions that were periodically dumped in large numbers on the slope of the mound. At present, this corpus presents a unique discovery in the central Zagros, providing solid evidence for a developed administrative practice within small, local centers in a region

that is still often and wrongfully characterized as abandoned and underdeveloped in comparison to its Mesopotamian neighbors during the Bronze Age. A recent discovery of several sealings of roughly the same time period or slightly earlier at nearby Tepe Tilineh[33] at the western end of the Mahidasht region further confirms that Chogha Maran is not an anomaly, but instead indicative for a largely undocumented Bronze Age Zagros culture. Combined with the evidence from sites such as Tepe Giyan (Contenau & Ghirshman 1935), Seh Gabi (Henrickson 1988), Tepe Gheshlagh (Sharifi 2020), Dehsavar (Pollock et al. 2020), and Godin Tepe (Pittman 2011), as well as sites in the northern and southern Zagros, such as Pisdeli Tepe/Hajji Firuz (Voigt 1989), Tal-i Bakun (Alizadeh 1988; 1994; 2006), and most recently the Varzaneh region near Isfahan (Rafi'i et al. 2021), we now have clear evidence for a continuous tradition of administrative technology and the development of local institutions from at least the middle of the fifth millennium to the third millennium BCE. Unfortunately, many of these datasets remain largely unpublished or not systematically studied, so that we have very little information regarding the context in which these administrative practices developed or the emergence of administrative institutions who yielded these tools.

Reconstructing the administrative system and its participants presents a difficult challenge since the corpus consists of small, broken pieces of clay sealings that were discarded and possibly burnt with other trash. Based on the large amount of wall sealings, which would have been applied on closed doors that were plastered over, the trash dumps likely reflect a periodic opening of storage rooms where goods were kept for a longer period of time. One scenario to explain the observed pattern is a communal storage structure where different households had a designated room, similar to the northwest African 'agadirs' (De Meulemeester 2005; Jacques-Meunié 1944; 1949; Keddane 2018; Naji 2007; Suter 1964).[34] These were multiroomed, communal buildings where households from the local town and

[33] S. Alibaigi pers. comm.: these sealings, which were retrieved during local construction works, are undergoing analysis in preparation of publication.

[34] In both eastern and western Iran, anthropologists have documented similar systems of storage organization for food, resources, and family documents (Moradi et al. 2018; Rahimkhani & Sabori 2019). This system consists of a communally maintained storage location, which can take the form of natural cavities in rock formations located near the settlement, where each family has access to a storage unit that is passed down the generations. Often these storage units are sealed off with mud and sealed with finger impressions.

mobile tribes securely stored their private property and produce in small rooms. Such a system has also been proposed for Neolithic Sabi Abyad (Akkermans & Duistermaat 1996; 2004; Duistermaat 2010) and the Early Bronze Age Hamrin round buildings (Renette 2010).

Our analysis of the imprints of covers and containers on clay sealings indicates a large amount of storage of liquids. Possibly, dry goods were stored in bins, bags, and jars inside rooms that were closed and sealed, while containers with liquids were individually sealed. The combined evidence for periodic opening of storage spaces and mass discard of trash that includes broken sealings, small drinking cups, painted vessels and stone vessels, and evidence for a disproportionate amount of storage of liquids, strongly suggests to us the possibility that the excavations at Chogha Maran retrieved the remains of frequent feasting events. In preparation of such events, which could have taken place at regular intervals (e.g. annual), special foods and liquids were prepared and stored for communal consumption. Possibly, the town of Chogha Maran hosted visitors from other settlements and, if present, a mobile component of society, with events that offered the opportunity to forge social ties, exchange goods and information, and find marriage partners. Solid evidence for such practices needs to be identified in future fieldwork, but at the contemporary site of Kani Shaie, located at the western edge of the Zagros Mountains near modern-day Sulaymaniyah in Iraqi Kurdistan, a similar picture is emerging with a communal storage facility (including sealings; Renette in press b), large amounts of small drinking vessels, and large storage jars for liquids (Renette 2018: 196-296; Renette et al. in press). Of course, alternative scenarios remain feasible explanations, such as a communal storage facility, as a strategy to secure sustainability and risk management, maintained by the sedentary community at Chogha Maran, which relied predominantly on their own food production and resource procurement during a time following the Late Chalcolithic and the Proto-Elamite period when long-distance exchange networks had significantly reduced in scale, resulting in a high degree of localized cultural traditions and a renewed reliance on the local community (Ristvet 2017: 39-40). Regardless, the evidence from Chogha Maran demonstrates a continuity from the Chalcolithic with growing villages and the establishment of local centers with some degree of complex social organization and administrative institutions during the first half of the third millennium BCE. Past surveys in the Zagros failed to identify settlements of this period, resulting in a flawed narrative of

regional abandonment or a transition to a predominantly nomadic society (Alizadeh 2010: 354-360; de Miroschedji 2003; Goff 1971: 145; Hole 1987; 2007: 75; Mortensen 1972; 1974: 32; 1976: 47-48; Wright 1987: 146-147). However, the excavations at Chogha Maran invalidate such narratives and demonstrate that the lack of EBA settlements in survey data is a result of a poor understanding of the period's material culture (i.e., ceramic production).

14. Conclusions

The site of Chogha Maran, located near Kermanshah in the western central Zagros Mountains, was excavated for a four-week period in 1978 as part of the Mahidasht Survey Project, led by L.D. Levine of the Royal Ontario Museum in Toronto. The archival records of this project are now housed at the Royal Ontario Museum together with a study collection of pottery, while most of the material collected during survey and excavations is stored at the National Museum of Iran in Tehran where a new inventorization program is in progress. While the goal of the excavations at Chogha Maran was mainly to obtain a stratigraphically anchored sequence of the Chalcolithic period, the soundings exposed mainly a series of trash dumps from the early third millennium BCE (Early Bronze Age) that overlay a long sequence of settlements of the fifth millennium BCE (Chalcolithic). These excavations collected the only stratified collection of material that can be securely dated to the Late Chalcolithic and first part of the Early Bronze Age in the western central Zagros, thereby complementing the work at Godin Tepe in the eastern central Zagros. Earlier surveys in the region, including the Mahidasht survey of 1975-78, struggled to identify the material culture and settlements of the Late Chalcolithic and Early Bronze Age, as they largely relied on the sequence from Godin Tepe and well-documented assemblages from Mesopotamia and southwestern Iran. However, due to a high degree of localized traditions in the Zagros Mountains, these comparative datasets were of only minimal use. Unfortunately, due to the hurried end of fieldwork in Iran in 1978 and subsequent changes in the careers of the project's main researchers, the important results from Chogha Maran and the survey were never published in any detail.

Based on archival research at the Royal Ontario Museum and analysis of the clay sealings from Chogha Maran at the National Museum of Iran, we have presented here a detailed report of the excavation results. We

consider the presentation of this material particularly urgent at a time when fieldwork in the western central Zagros is once again growing with new survey projects and targeted excavations. Also, the new explosion of fieldwork in nearby Iraqi Kurdistan will benefit from a detailed publication of a major dataset from the Zagros Mountains. The ceramic traditions of the late fifth and the early third millennium BCE in the Zagros remain rather poorly understood, which is reflected in their often only cursory treatment in recent publications of survey results. These periods are of particular importance as they present pivotal moments in the transition from the region's village-based prehistory to the historical periods when the central Zagros was home to powerful polities (such as the Guti and possibly Awan) that were organized around central towns. The evidence from Chogha Maran illustrates this process with a continuous development of material culture and an administrative practice used in communal storage, possibly organized around periodic feasting events.

While a final publication of the Mahidasht Survey Project and its excavations of several important stratified sequences still awaits, we hope that this extensive article provides a new dataset that allows for the identification of material in ongoing survey projects in the region. With the digital tools now available to us, it is finally possible to study the separated archival records and the archaeological materials together. Staff at the National Museum of Iran are actively working to organize their Mahidasht collection (Renette, Mohammadi Ghasrian & Ghafoori, in press) that hopefully will lead to more publications of this dataset, which presents the most extensive survey work done in the central Zagros Mountains and is therefore crucial for our understanding of the role of ancient mountain societies in the history of the ancient Near East.

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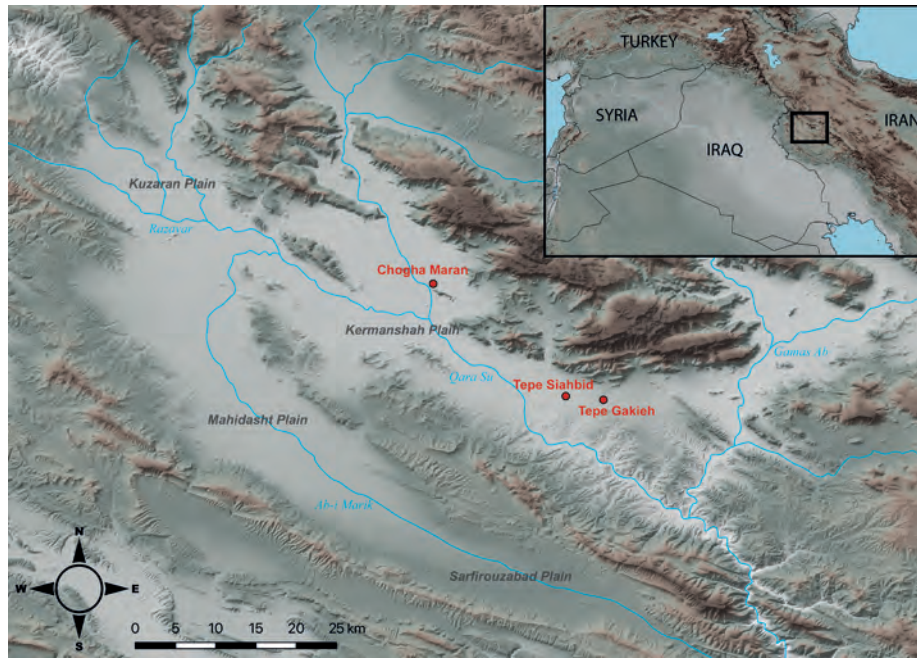

Plate 1 – Map of the Mahidasht-Kermanshah region with the location of Chogha Maran, Tepe Siahbid, and Tepe Gakieh (map by S. Renette).

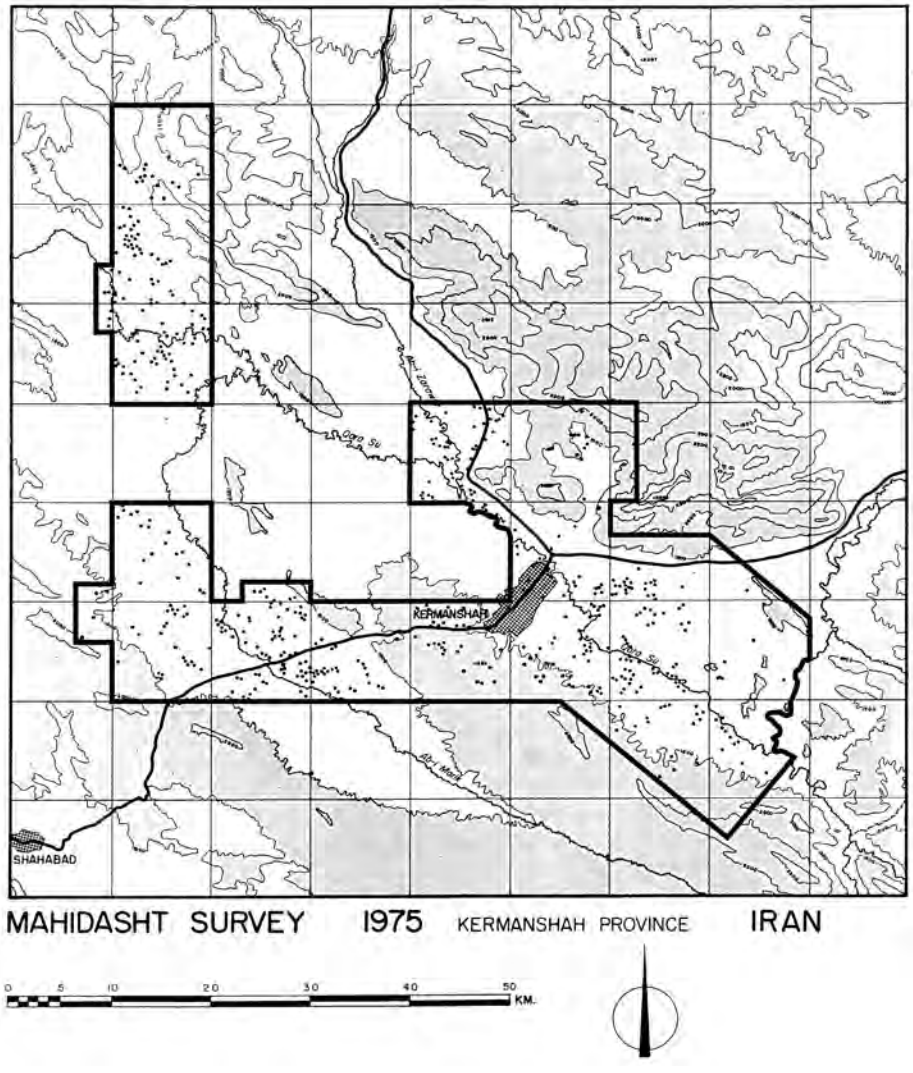

Plate 2 – 1975 survey map of the Mahidasht Survey Project
(from the project archive at the ROM).

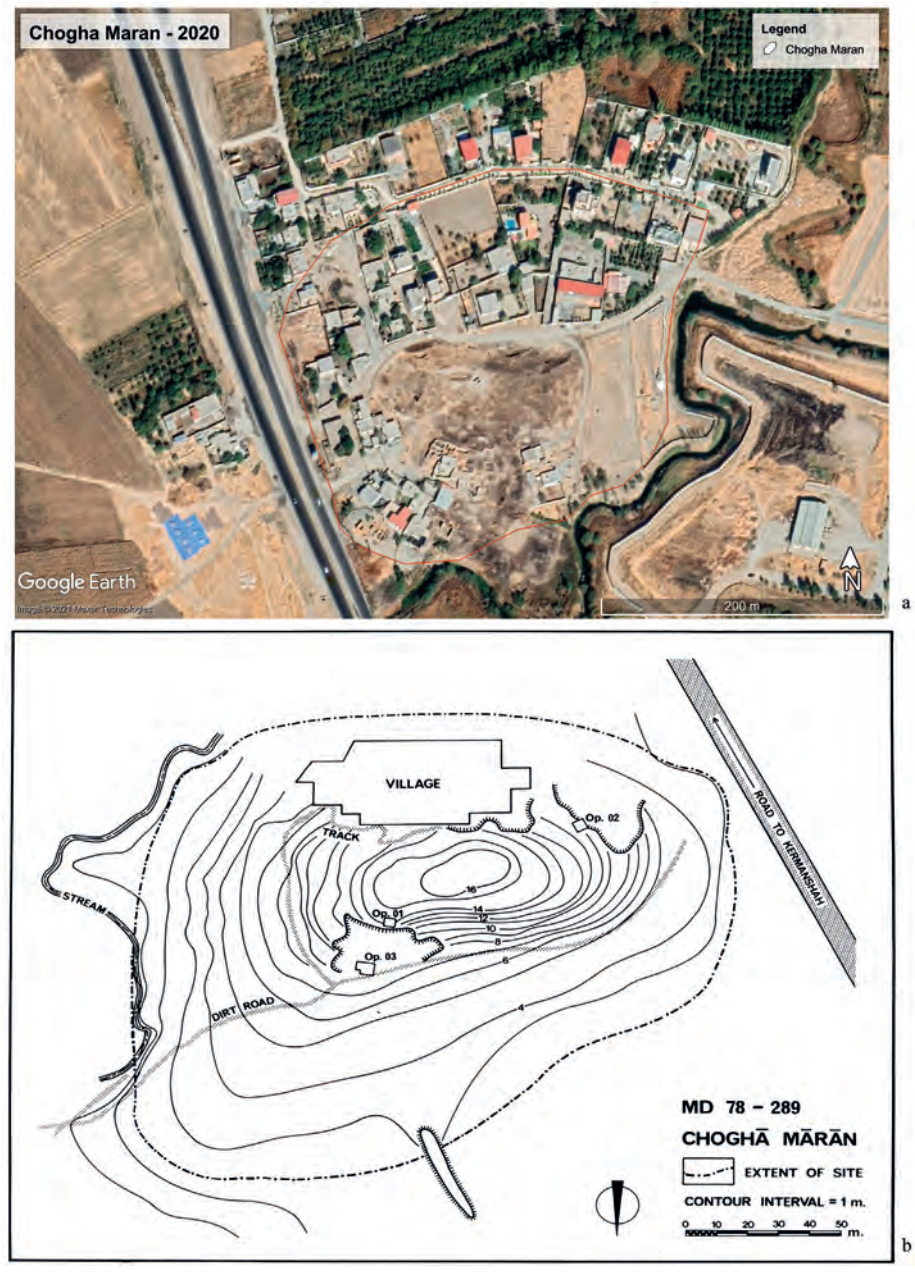

Plate 3 – Chogha Maran: a/ satellite image of the site in 2020 (Google Earth); b/ 1978 topographical sitemap with location of the three operations (note: north is facing down) (from the project archive at the ROM).

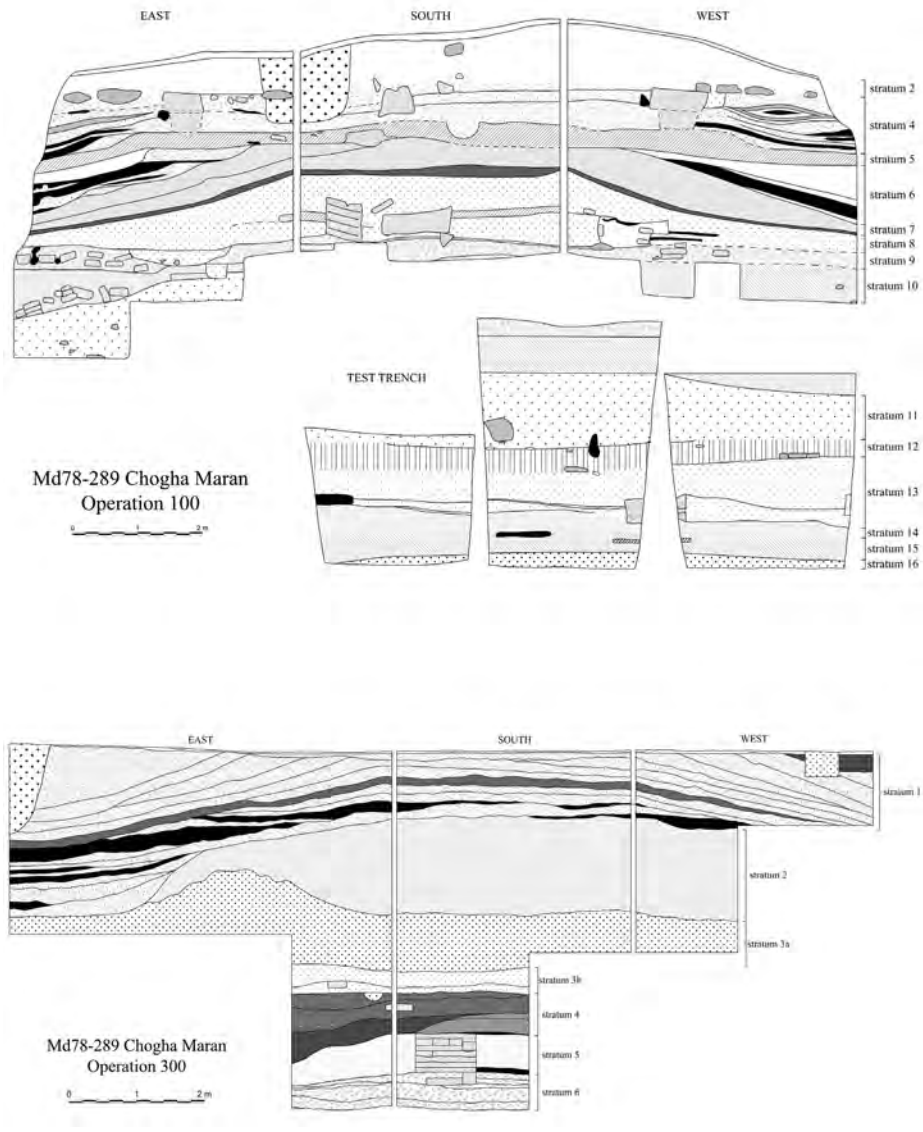

Plate 4 – Section drawings of operations 100 and 300
with reconstructed trench periodization.

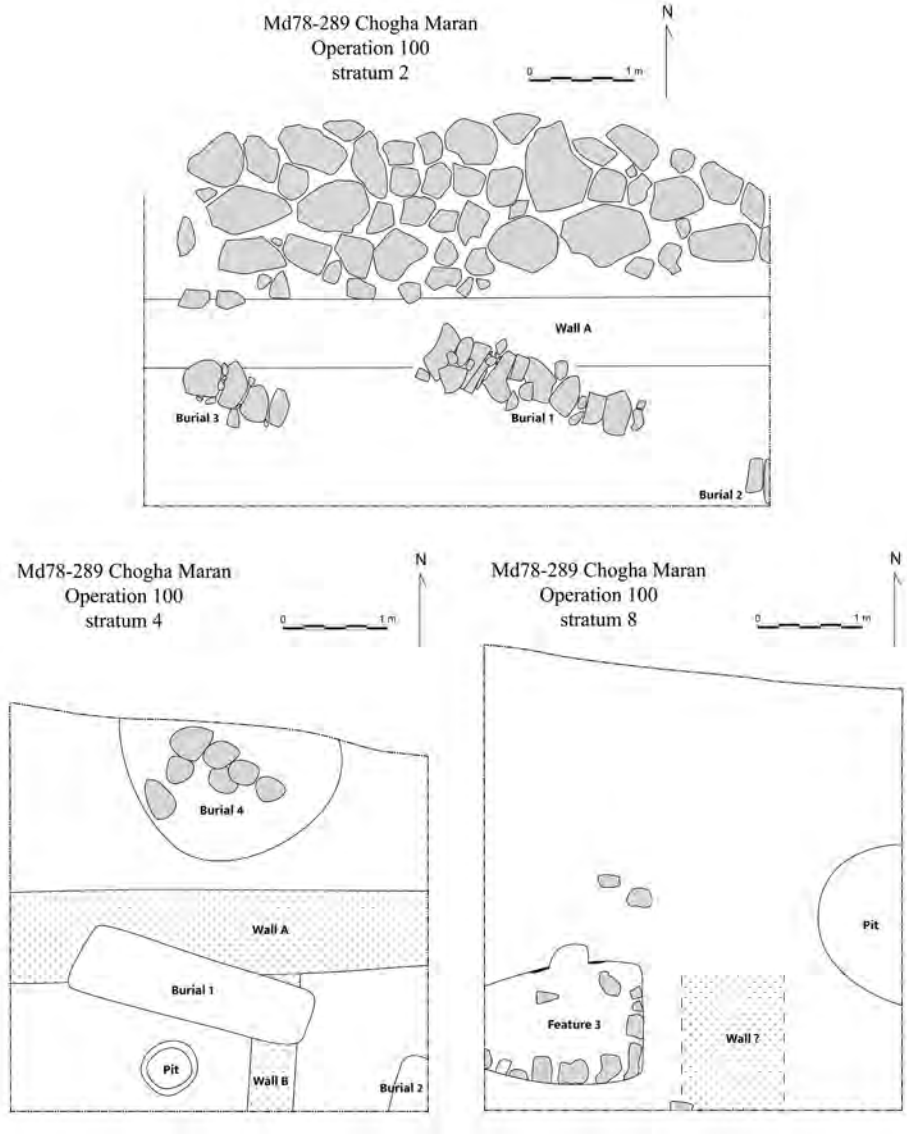

Plate 5 – Excavation plans of strata 2, 4, and 8 in operation 100.

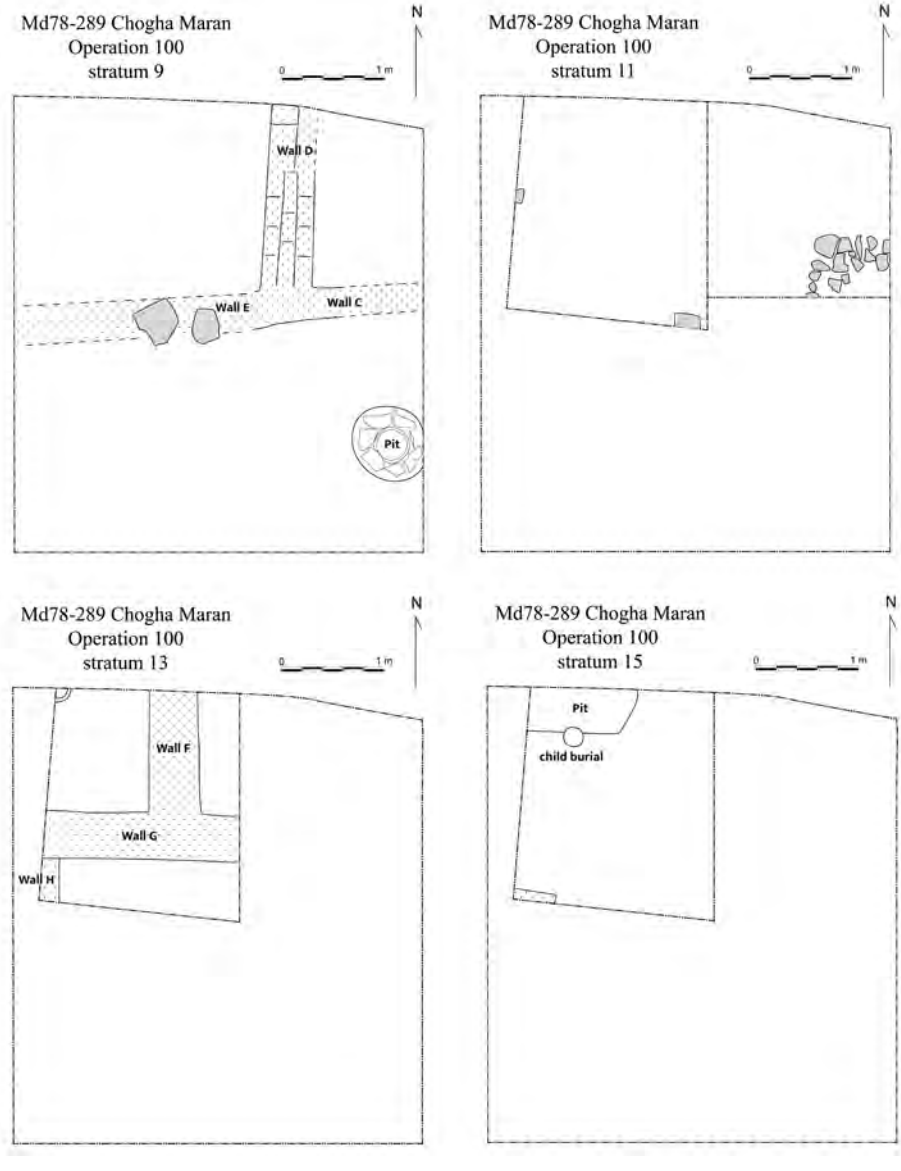

Plate 6 – Excavation plans of strata 9, 11, 13, and 15 in operation 100.

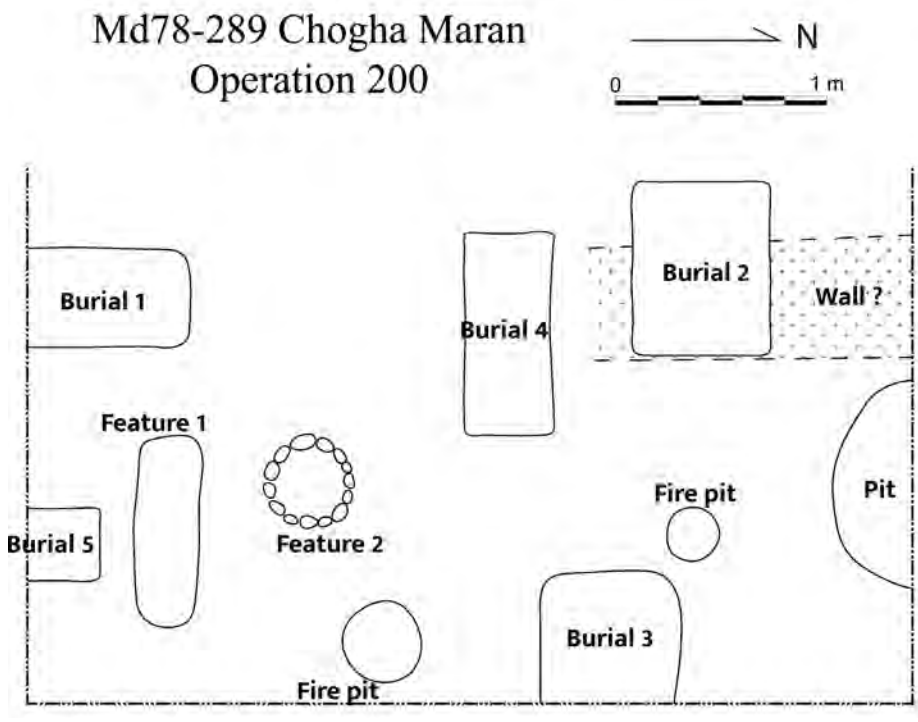

Plate 7 – Reconstructed excavation plan of operation 200.

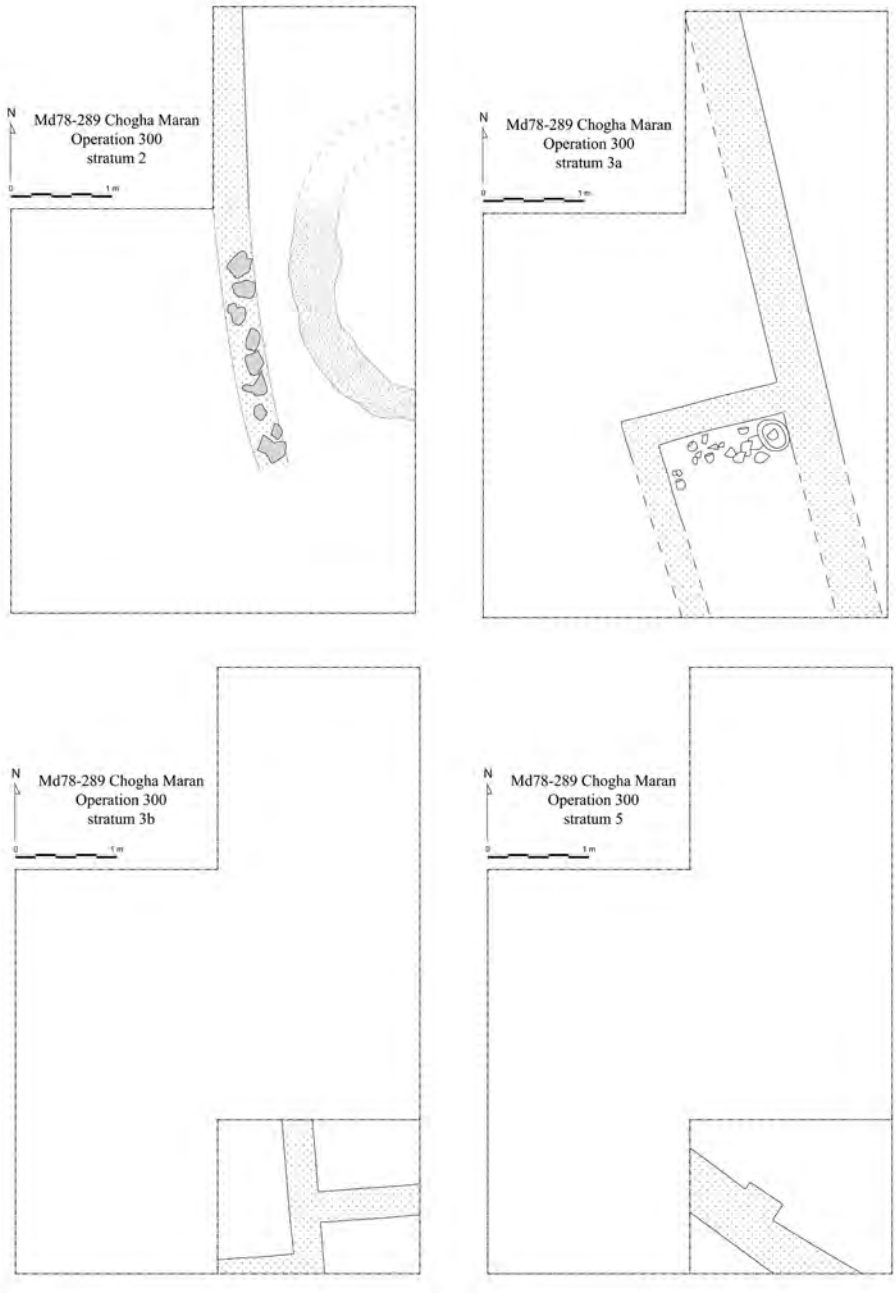

Plate 8 – Excavation plans of strata 2, 3a, 3b, and 5 in operation 300.

Table 6 – Plate 9

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
EBA BOWLS						
1	round bowl	153	100 - str. 6	12	MRS	
2	round bowl	153	100 - str. 6	14	MRS	
3	round bowl	347	300 - str. 2	21	MF grit	brown burnished surface
4	round bowl	153	100 - str. 6	33	MRS	
5	round bowl	103	100 - str. 2	25	MRS	
6	round bowl	153	100 - str. 6	25	MRS	
7	round bowl	310	300 - str. 2	19	C grit	
8	round bowl	154	100 - str. 6	14	MF grit	
9	straight-sided bowl	168	100 - str. 8b	31	MF chaff	
10	straight-sided bowl	169	100 - str. 8b	15	MF chaff	
11	straight-sided bowl	154	100 - str. 6	16	MRS	
12	straight-sided bowl	306	300 - str. 1f	20	MGS	
13	bowl with inner lug	173	100 - str. 9	38	MF chaff	
14	bowl with inner lug	111	100 - str. 4a	25	MF chaff	

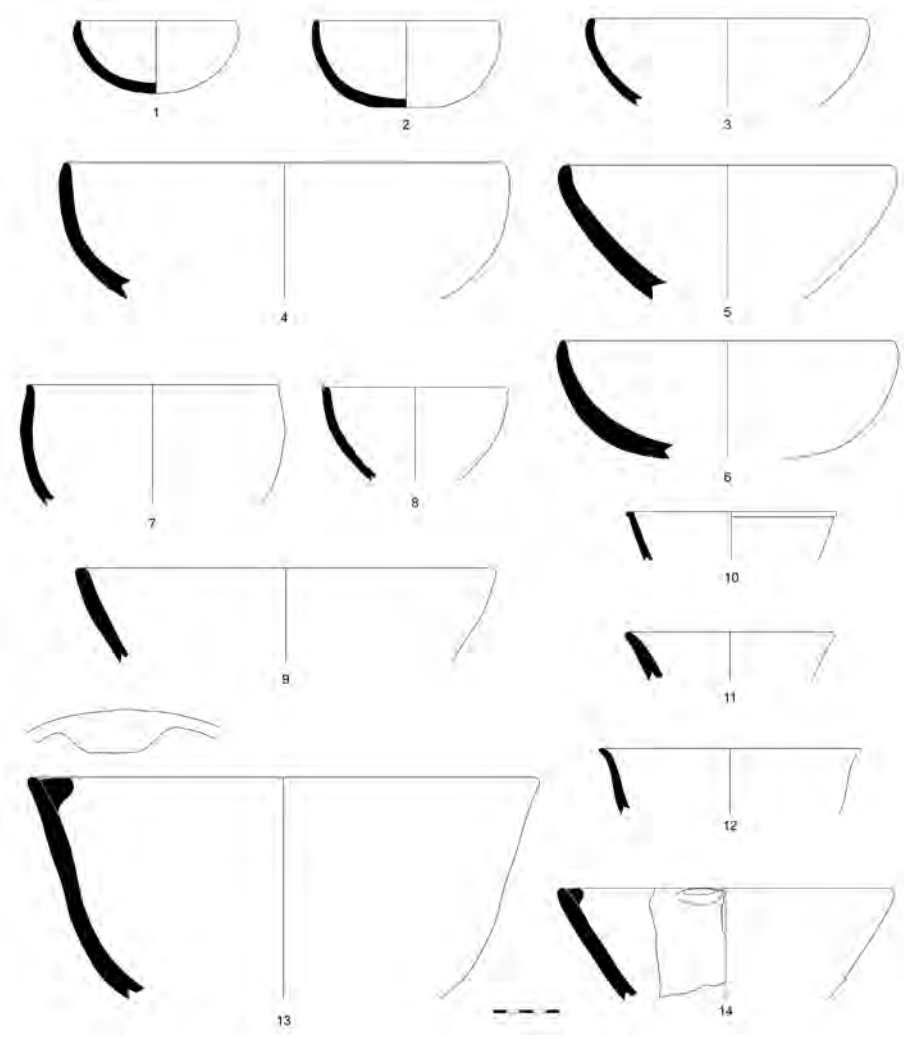

Plate 9 – Early Bronze Age pottery: bowls.

Table 7 – Plate 10

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
EBA JARS						
1	lugged jar	167	100 - str. 8b	-	MGS	crescent lug
2	lugged jar	152	100 - str. 5	-	MRS	applied lug
3	lugged jar	342	300 - str. 2	-	MRS	applied knob
4	lid	107	100 - str. 4a	15,5	MRS	
5	thickened rim jar	130	100 - str. 4c	13	MF chaff	
6	everted rim jar		surface	-	MRS	pierced lug
7	everted rim jar	302	300 - str. 1a	6	MGS	pierced lug
8	everted rim jar	218	200 - str. 3	-	MRS	
9	everted rim jar	320	300 - str. 1f	12	MRS	
10	everted rim jar	153	100 - str. 6	9	MRS	
11	everted rim jar	153	100 - str. 6	11	MRS	
12	everted rim jar		surface	17	MGS	applied lug
13	everted rim jar	150	100 - str. 5	14	MRS	applied knob
14	everted rim jar	153	100 - str. 6	12	MRS	
15	everted rim jar	153	100 - str. 6	10	MRS	
16	everted rim jar	326	300 - str. 1b	21	MGS	crescent lug
17	everted rim jar	310	300 - str. 2	33	MRS	loop handle
18	everted rim jar	173	100 - str. 9	35	MRS	loop handle
19	everted rim jar	111	100 - str. 4a	24	MRS	
20	everted rim jar	141	100 - str. 4c	24	MRS	
21	everted rim jar	153	100 - str. 6	50	MRS	
22	hole-mouth jar	323	300 - str. 1f	47	MRS	pinched rim
23	slosh-proof jar	136	100 - str. 4c	46	MRS	
24	hole-mouth jar	153	100 - str. 6	22	MRS	
25	hole-mouth jar	310	300 - str. 2	21	MGS	
26	hole-mouth jar	223	200 - str. 3	24	MGS	
27	hole-mouth jar	341	300 - str. 2	32	MRS	

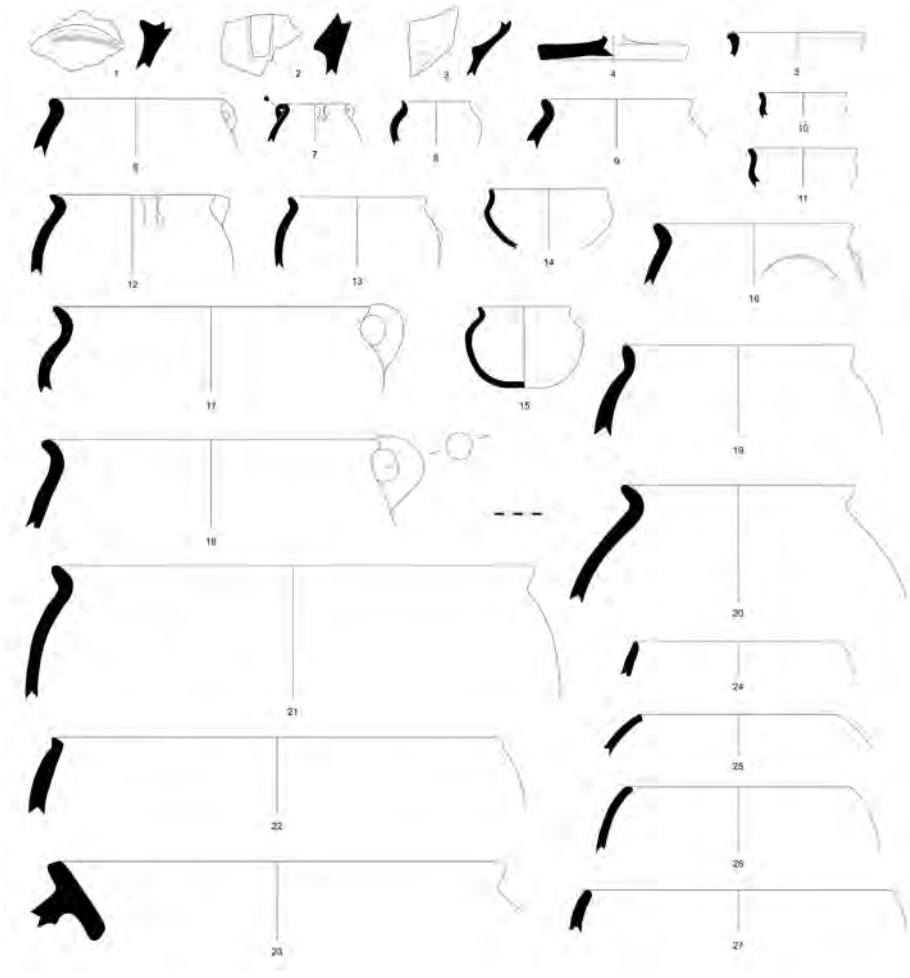

Plate 10 – Early Bronze Age pottery: jars.

Table 8 – Plate 11

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
EBA PAINTED WARE						
1	jar	175	100 - str. 9	12	SW	Scarlet Ware
2	jar	160	100 - str. 7	-	SW	Scarlet Ware
3	jar	n/a	n/a	-	GTP	Godin III painted ware
4	jar	n/a	n/a	-	GTP	Godin III painted ware
5	wide-mouth jar	n/a	n/a	14	GTP	Godin III painted ware
6	high-necked jar	n/a	n/a	-	GTP	Godin III painted ware
7	high-necked jar	n/a	n/a	-	GTP	Godin III painted ware
8	high-necked jar	n/a	n/a	12	GTP	Godin III painted ware
EBA CARINATED CUPS						
9	carinated small cup	309	300 - str. 1b	8	CC	
10	carinated small cup	319	300 - str. 1b	7	MRS	
11	carinated small cup	111	100 - str. 4a	6	MRS	
12	carinated small cup	153	100 - str. 6	10	CC	
13	carinated small cup	318	300 - str. 1e	9	CC	
14	carinated small cup	307	300 - str. 2	8	CC	
15	carinated small cup	182	100 - str. 9	8	CC	
16	carinated small cup	323	300 - str. 1f	9	CC	fingernail impressions
17	carinated small cup	304	300 - str. 1c	10	CC	fingernail impressions
18	carinated small cup	316	300 - str. 1d	8,5	CC	fingernail impressions
19	carinated small cup	153	100 - str. 6	8	CC	fingernail impressions
20	carinated small cup	173	100 - str. 9	-	CC	white filled punctate impressions

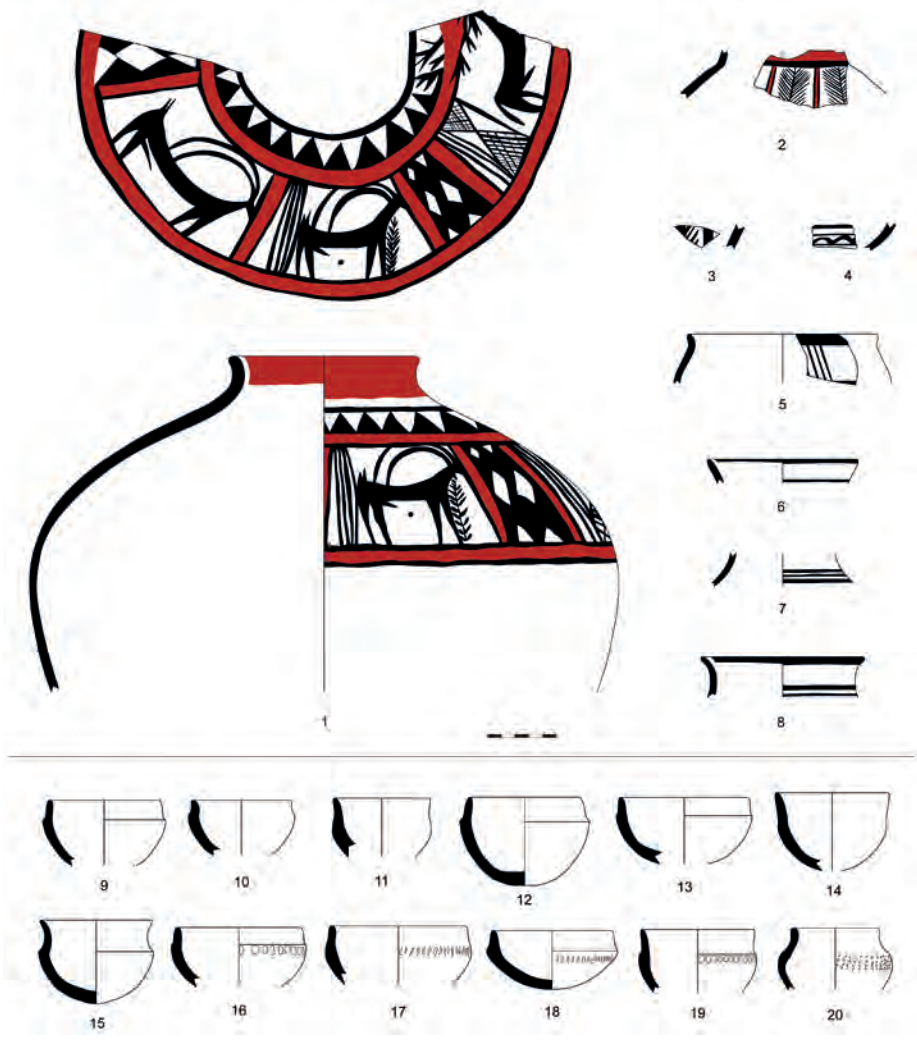

Plate 11 – Early Bronze Age pottery: painted sherds (1-7) and carinated cups (8-19).

Table 9 – Plate 12

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
LC1 BOWLS & TRAYS						
1	conical bowl	341	300 - str. 2	18	MF chaff	red slipped
2	inward beveled rim bowl	358	300 - str. 4	26	C chaff	red slipped
3	cup	354	300 - str. 3a	7	MF chaff	
4	cup	354	300 - str. 3a	11	MF chaff	
5	beaker	197	100 - str. 12	11	MF chaff	
6	conical bowl	173	100 - str. 9	23	MF chaff	
7	conical bowl	342	300 - str. 2	23	MF chaff	
8	conical bowl	195	100 - str. 11	21	MF chaff	
9	conical bowl	401	100 - str. 13a	18	MF chaff	
10	conical bowl	328	300 - str. 2	13	MF chaff	white surface
11	conical bowl	351	300 - str. 2	24	C chaff	
12	conical bowl	223	200 - str. 3	24	C chaff	
13	conical bowl	195	100 - str. 11	-	C chaff	red slipped
14	conical bowl	367	300 - str. 3b	32	MF chaff	
15	conical bowl	197	100 - str. 12	22	MF chaff	white surface
16	conical bowl	161	100 - str. 7	-	C chaff	red slipped
17	conical bowl	311	300 - str. 2	18	MF chaff	
18	conical bowl	183	100 - str. 9	24	MF chaff	
19	conical bowl	354	300 - str. 3a	38	C chaff	
20	conical bowl	176	100 - str. 8b	35	MF chaff	
21	conical bowl	337	300 - str. 2	39	MF chaff	white surface
22	tray	197	100 - str. 12	26	C chaff	
23	tray	197	100 - str. 12	34	MF chaff	
24	tray	215	200 - str. 2	-	MF chaff	white surface
25	tray	223	200 - str. 3	-	MF chaff	grey slipped
26	tray	192	100 - str. 11	-	C grit	

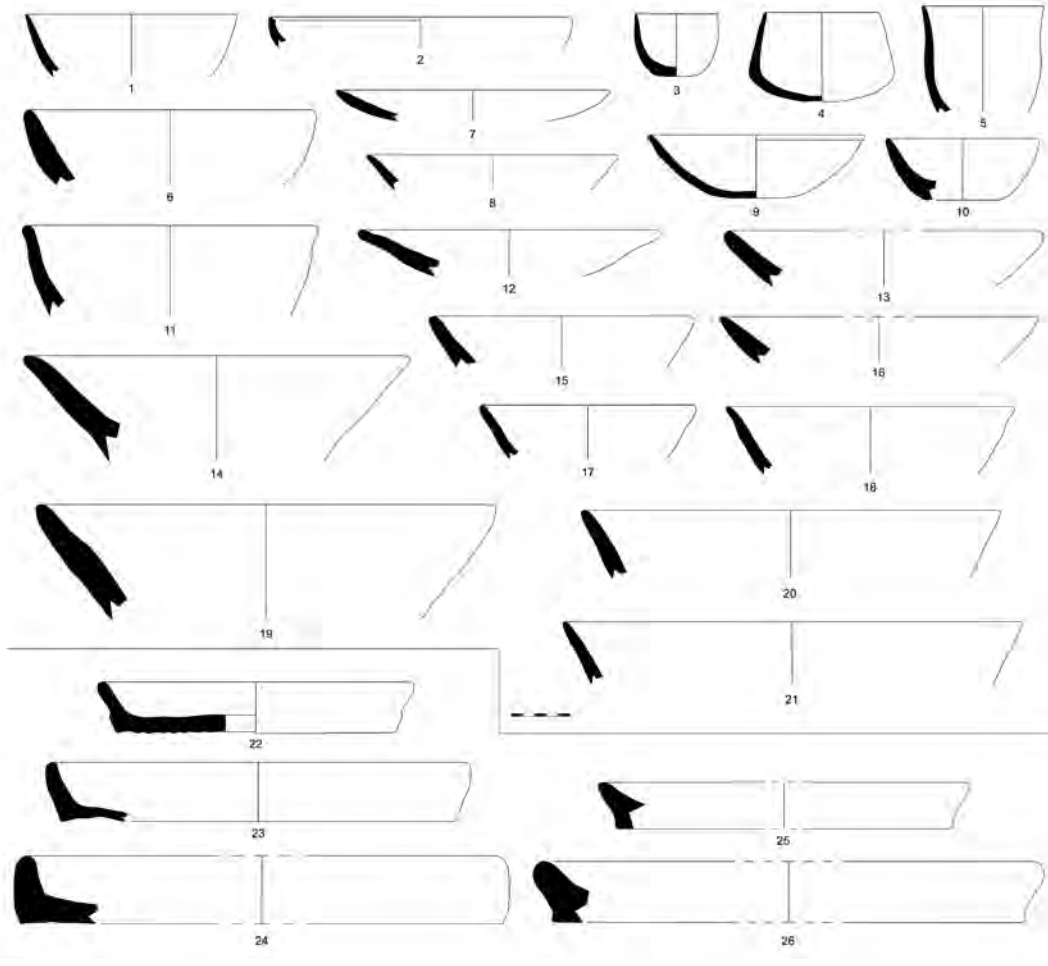

Plate 12 – Late Chalcolithic 1 pottery: plain bowls and trays.

Table 10 – Plate 13

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
LC1 JARS						
1	spouted hole-mouth jar	195	100 - str. 11	15	C chaff	red slipped
2	straight-sided pot	344	300 - str. 3b	14	MF chaff	white surface
3	straight-sided pot	223	200 - str. 3	16	MF grit	
4	everted rim jar	340	300 - str. 2	14	C grit	
5	angle-neck jar	186	100 - str. 10	17	MF chaff	
6	angle-neck jar	367	300 - str. 3b	20	?	
7	angle-neck jar	350	300 - str. 3a	21	MF chaff	
8	angle-neck jar	367	300 - str. 3b	26	C grit	
9	hole-mouth jar	199	100 - str. 11	15	C grit	
10	everted rim jar	311	300 - str. 2	11	MF chaff	
11	everted rim jar	186	100 - str. 10	10	MF chaff	
12	everted rim jar	326	300 - str. 1b	9	MF chaff	white surface
13	fold-over rim jar	197	100 - str. 12	20	MF chaff	
14	fold-over rim jar	333	300 - str. 1f	20	C grit	
15	everted rim jar	340	300 - str. 2	19	C grit	
16	everted rim jar	193	100 - str. 11	23	C grit	
17	everted rim jar	196	100 - str. 11	16	C grit	wing lug
18	hole-mouth jar	218	200 - str. 3	59	C grit	

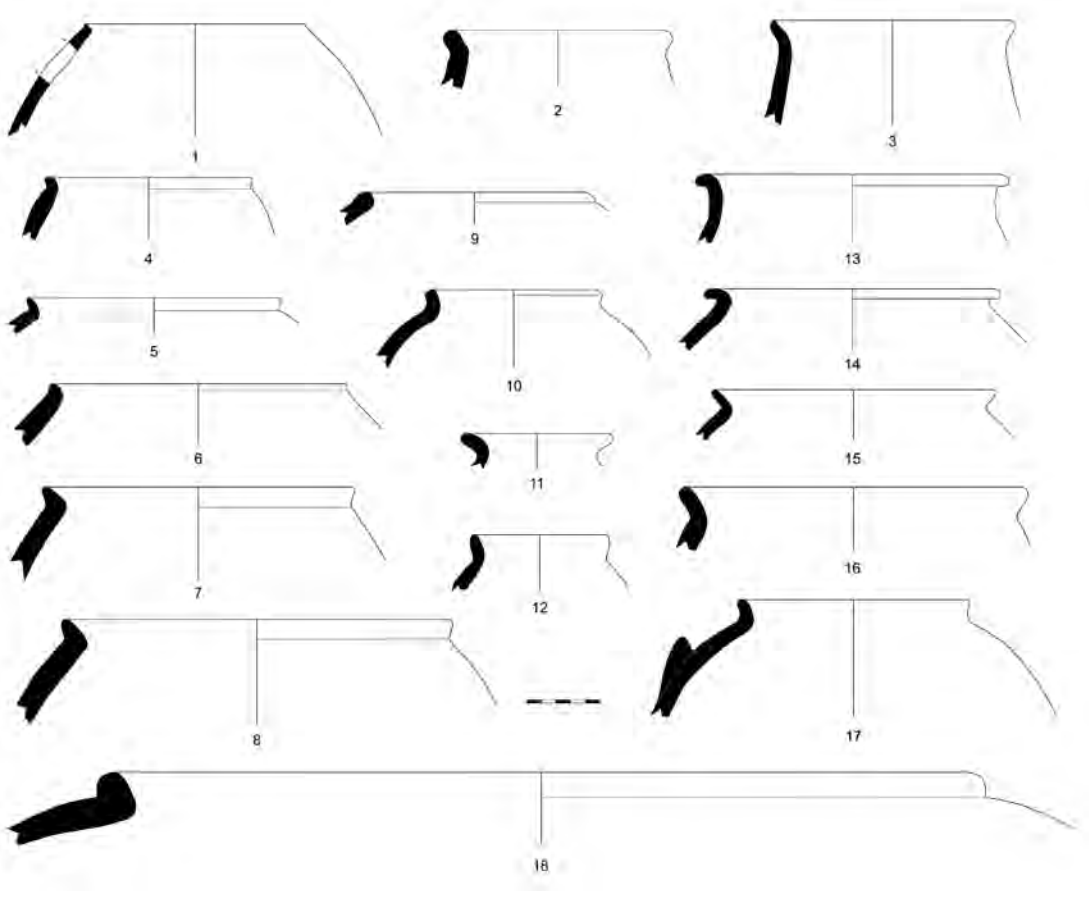

Plate 13 – Late Chalcolithic 1 pottery: plain jars.

Table 11 – Plate 14

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
LC1 RWB PAINTED WARE - BOWLS						
1	deep bowl	403	100 - str. 11	-	RWB	
2	deep bowl	346	300 - str. 3b	20	RWB	
3	deep bowl	349	300 - str. 3b	20	RWB	
4	conical bowl	342	300 - str. 2	4	RWB	
5	conical bowl		surface	16	RWB	
6	deep bowl	311	300 - str. 2	10	RWB	
7	deep bowl	154	100 - str. 6	18	RWB	
8	conical bowl		surface	15	RWB	
9	conical bowl	405	100 - str. 13b	22	RWB	outer surface scraped
10	conical bowl	159	100 - str. 7	18	RWB	
11	conical bowl	343	300 - str. 3a	16	RWB	outer surface scraped
12	conical bowl	197	100 - str. 12	20	RWB	
13	conical bowl	311	300 - str. 2	18	RWB	outer surface scraped
14	conical bowl	344	300 - str. 3b	21	RWB	
15	conical bowl	368	300 - str. 3b	22	RWB	outer surface scraped
16	conical bowl	195	100 - str. 11	20	RWB	
17	conical bowl	356	300 - str. 3b	26	RWB	
18	conical bowl	161	100 - str. 7	34	RWB	flattened rim
19	conical bowl	195	100 - str. 11	36	RWB	
20	conical bowl	311	300 - str. 2	40	RWB	
21	conical bowl		surface	20	RWB	
22	conical bowl	343	300 - str. 3a	18	RWB	
23	conical bowl		surface	14	RWB	
24	conical bowl	343	300 - str. 3a	23	RWB	
25	conical bowl	354	300 - str. 3a	22	RWB	
26	conical bowl		surface	28	RWB	outer surface scraped

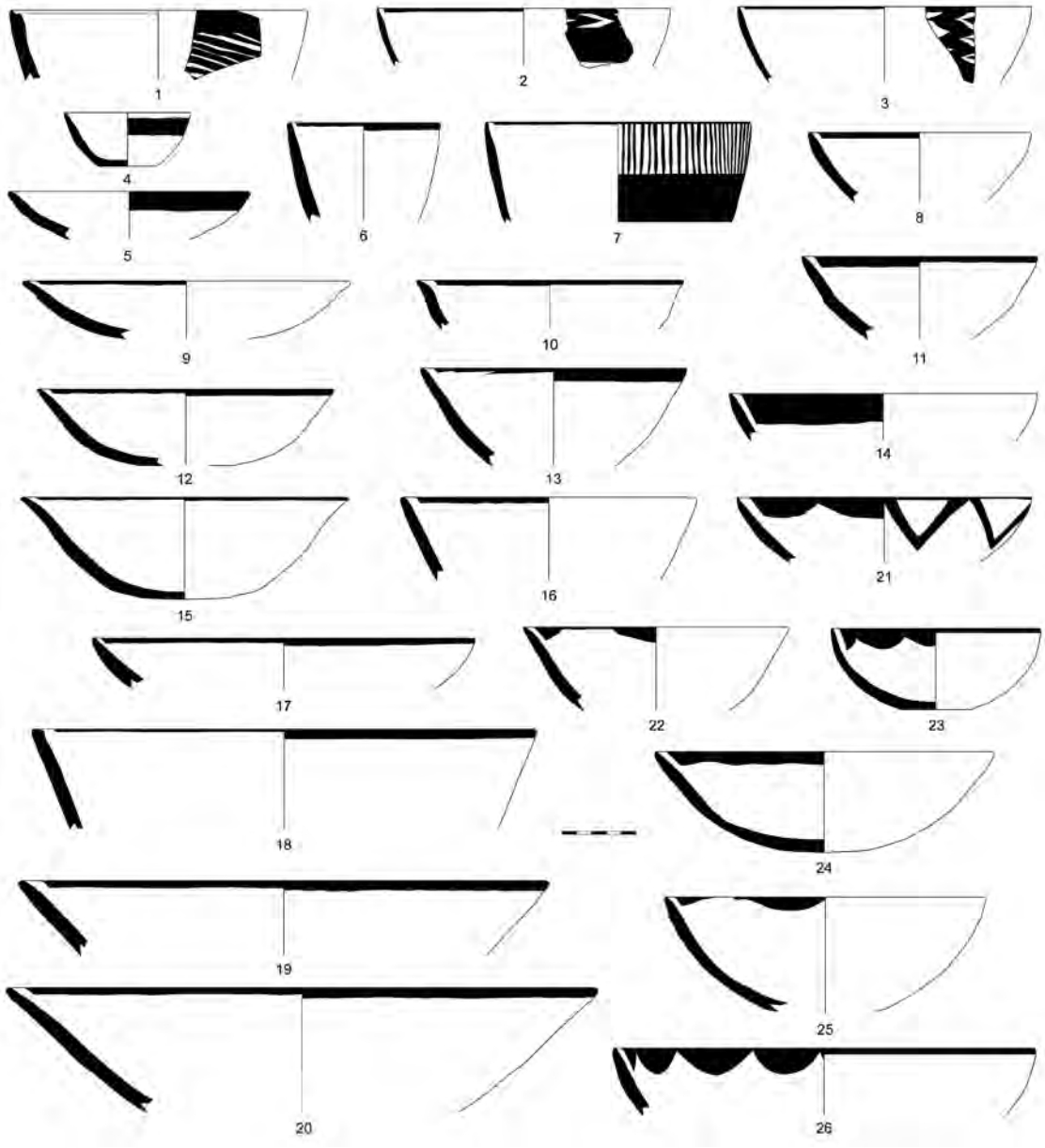

Plate 14 – Late Chalcolithic 1 pottery: RWB painted bowls.

Table 12 – Plate 15

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
LC1 RWB PAINTED WARE - JARS						
1	hole-mouth jar		surface	15	RWB	
2	everted rim jar	343	300 - str. 3a	9	RWB	
3	everted rim jar	353	300 - str. 3a	14	RWB	
4	hole-mouth jar	405	100 - str. 13b	16	RWB	
5	everted rim jar		surface	11	RWB	
6	everted rim jar	161	100 - str. 7	13	RWB	
7	hole-mouth jar	367	300 - str. 3b	28	RWB	
8	hole-mouth jar	406	100 - str. 14	11	RWB	
9	everted rim jar	182	100 - str. 10	10	RWB	
10	straight-sided jar	367	300 - str. 3b	16	RWB	
11	hole-mouth jar	343	300 - str. 3a	43	RWB	
12	straight-sided jar	357	300 - str. 3a	20	RWB	
13	straight-sided jar	344	300 - str. 3b	40	RWB	
14	straight-sided jar	406	100 - str. 14	26	RWB	
15	straight-sided jar	314	300 - str. 2	42	RWB	
16	straight-sided jar	202	200 - top	28	RWB	

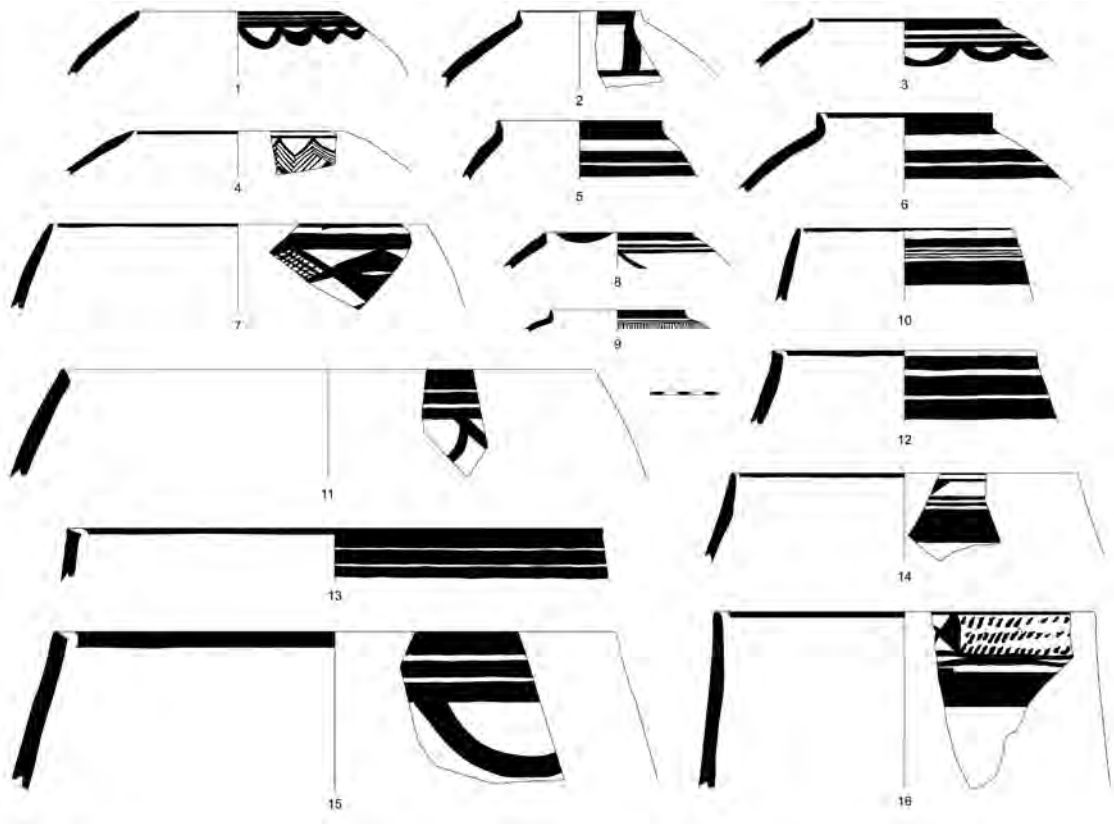

Plate 15 – Late Chalcolithic 1 pottery: RWB painted jars.

Table 13 – Plate 16

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
LC1 RWB PAINTED WARE - POTS						
1	everted rim jar	341	300 - str. 2	16	RWB	
2	globular bowl		surface	8	RWB	
3	globular bowl		surface	9	RWB	
4	straight-sided jar	313	300 - str. 1c	15	RWB	
5	straight-sided jar	405	100 - str. 13b	18	RWB	
6	straight-sided jar	307	300 - str. 2	13	RWB	
7	globular pot	223	200 - str. 3	16	RWB	
8	globular pot	343	300 - str. 3a	18	RWB	
9	globular pot	354	300 - str. 3a	12	RWB	
10	globular pot		surface	17	RWB	
11	globular pot	354	300 - str. 3a	16	RWB	
12	globular pot	354	300 - str. 3a	13	RWB	
13	globular pot	354	300 - str. 3a	18	RWB	
LC1 BOR PAINTED WARE						
14	hole-mouth jar	160	100 - str. 7	34	BOR	
15	everted rim jar	359	300 - str. 4	8	BOR	
16	straight-sided jar	173	100 - str. 9	17	BOR	
17	hole-mouth jar	351	300 - str. 2	30	BOR	
18	hole-mouth jar	177	100 - str. 9	36	BOR	
19	hole-mouth jar	302	300 - str. 1a	36	BOR	
20	conical bowl	314	300 - str. 2	20	BOR	
21	conical bowl	367	300 - str. 3b	26	BOR	
22	globular bowl		surface	24	BOR	pinched spout

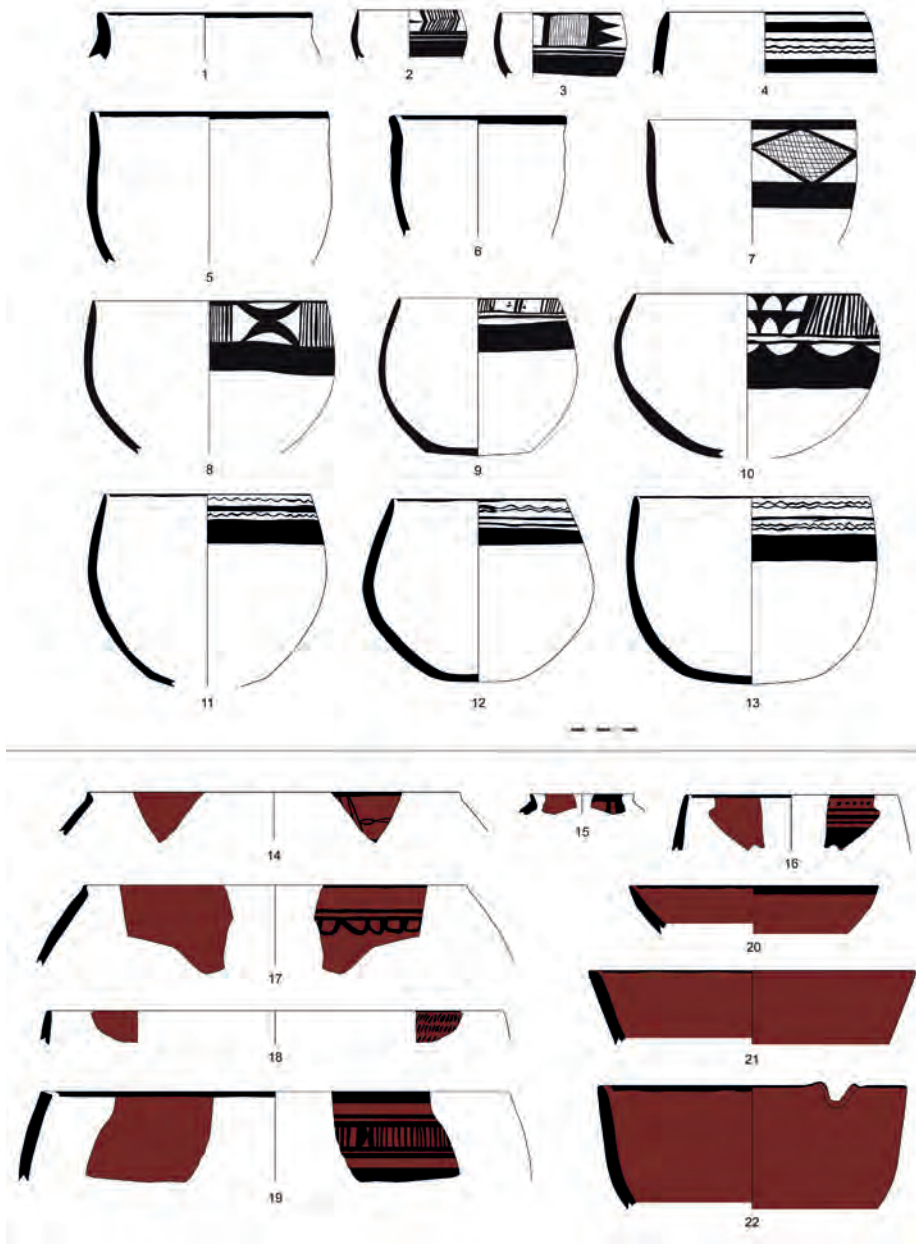

Plate 16 – Late Chalcolithic 1 pottery: RWB painted pots (1-13) and BOR painted vessels (14-22).

Table 14 – Plate 17

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
BOB PAINTED WARE - OPEN SHAPES						
1	straight-sided bowl	160	100 - str. 7	14	DUP	
2	globular pot	354	300 - str. 3a	12,5	BOB	
3	straight-sided bowl	357	300 - str. 3a	20	BOB	
4	straight-sided bowl	311	300 - str. 2	18	BOB	
5	straight-sided bowl	313	300 - str. 1c	16	DUP	
6	straight-sided bowl	176	100 - str. 8b	16	DUP	
7	straight-sided bowl	361	300 - str. 5	18	DUP	
8	straight-sided bowl	218	200 - str. 3	20	BOB	
9	conical bowl	354	300 - str. 3a	11	BOB	
10	conical bowl	400	100 - str. 13a	7	BOB	
11	conical bowl	410	100 - str. 16	9	BOB	
12	straight-sided bowl	337	300 - str. 2	8	BOB	
13	conical bowl	354	300 - str. 3a	24	BOB	
14	conical bowl	157	100 - str. 7	18	DUP	
15	conical bowl	306	300 - str. 1f	30	BOB	
16	conical bowl	358	300 - str. 4	16	DUP	

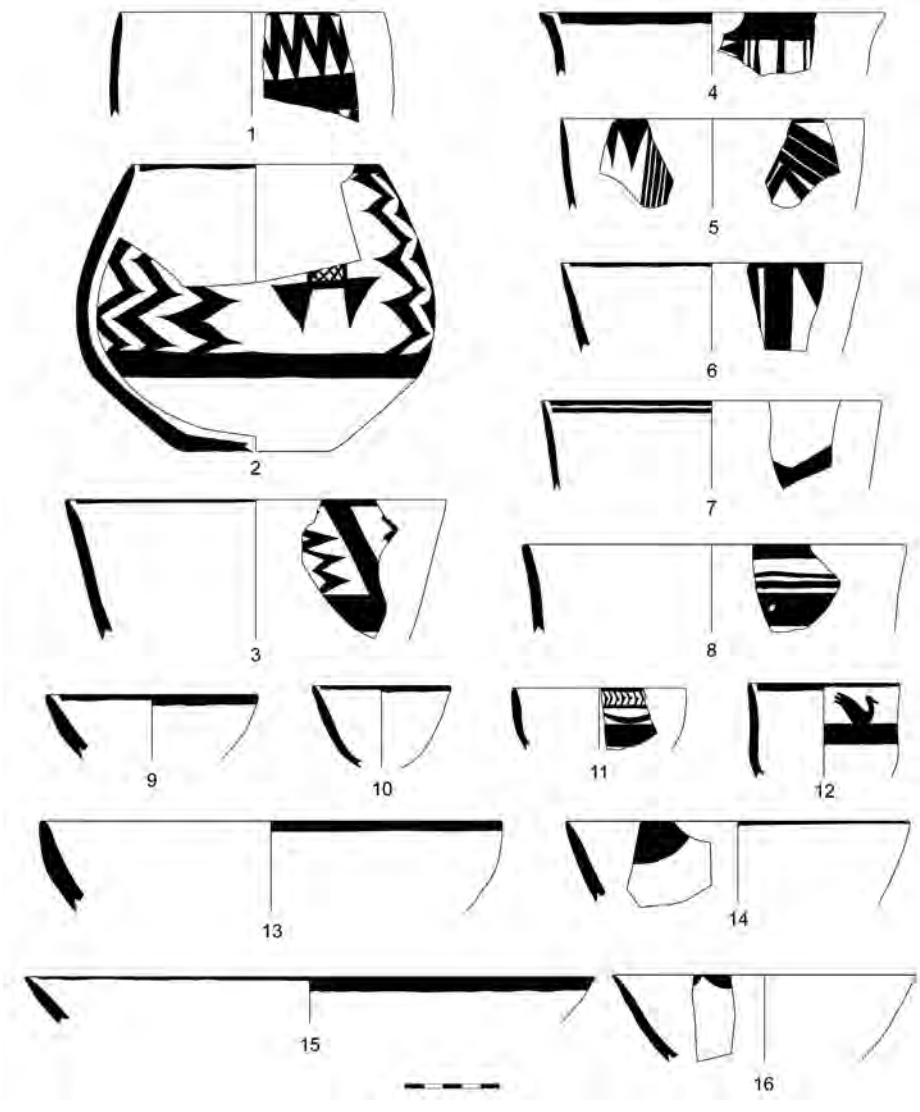

Plate 17 – Early Chalcolithic pottery: BOB painted bowls.

Table 15 – Plate 18

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
DALMA SURFACE MANIPULATED WARE						
1	globular jar		surface	10	DI	
2	globular jar	360	300 - str. 4	9	DI	
3	globular jar	180	100 - str. 9	10	DI	
4	globular jar		surface	12	DI	
BOB PAINTED WARE – CLOSED SHAPES						
5	globular jar	160	100 - str. 7	12	BOB	Dalma Painted imitation
6	hole-mouth jar	196	100 - str. 11	12	BOB	
7	hole-mouth jar	403	100 - str. 11	16	BOB	
8	everted rim jar	187	100 - str. 9	18	BOB	
9	everted rim jar	218	200 - str. 3	8	BOB	
10	everted rim jar	356	300 - str. 3b	12	BOB	
11	everted rim jar	187	100 - str. 9	16	BOB	
12		341	300 - str. 2	22	BOB	
13	everted rim jar	314	300 - str. 2	32	BOB	
14	hole-mouth jar	359	300 - str. 4	12	BOB	
15		359	300 - str. 4	9	DUP	

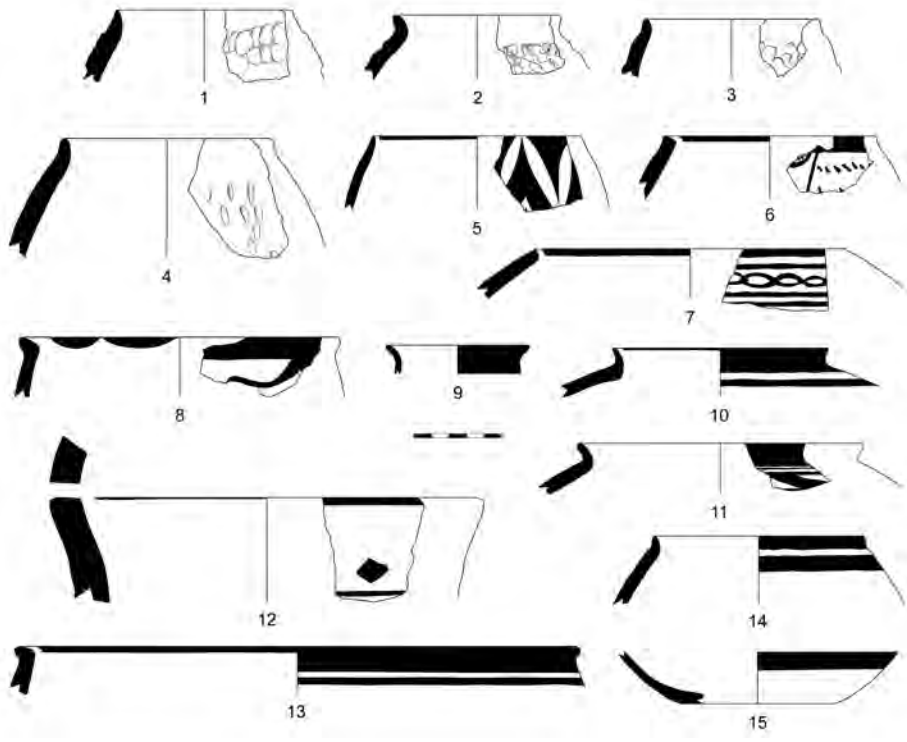

Plate 18 – Early Chalcolithic pottery:
Dalma Impressed ware (1-4) and painted BOB jars (5-15).

Table 16 – Plate 19

	Vessel Type	Findspot		Dia. (cm)	Ware	Comments
		Context	Stratum			
PAINTED J WARE						
1	straight-sided bowl	333	300 - str. 1f	32	J	
2	high-necked jar	362	300 - str. 5	8	J	
3	hole-mouth jar		surface	16	J	
4	conical bowl	352	300 - str. 2	20	J	
5	hole-mouth jar	405	100 - str. 13b	-	J	
PLAIN WARE						
6	conical bowl	366	300 - str. 6	46	C chaff	
7	straight-sided jar	366	300 - str. 6	25	C chaff	red-slipped

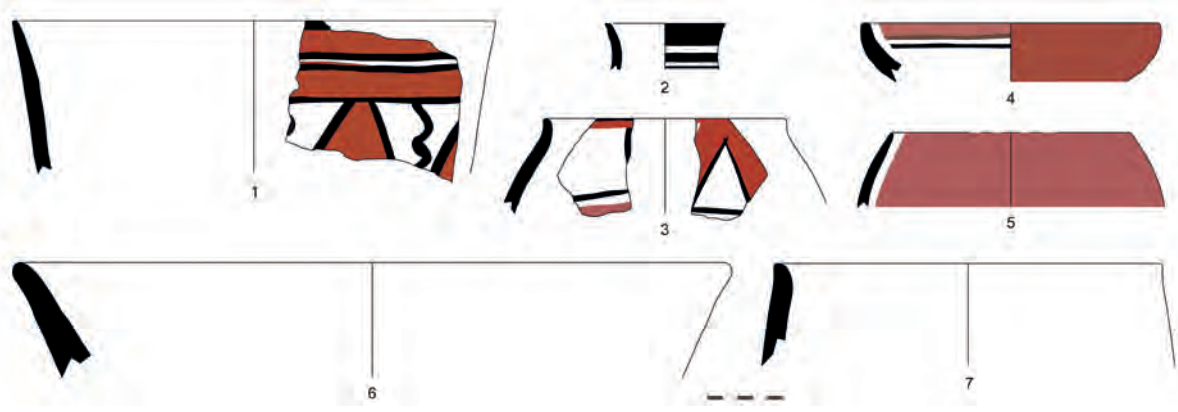

Plate 19 – Late Neolithic pottery: J ware painted sherds (1-5) and plain vessels (6-7).

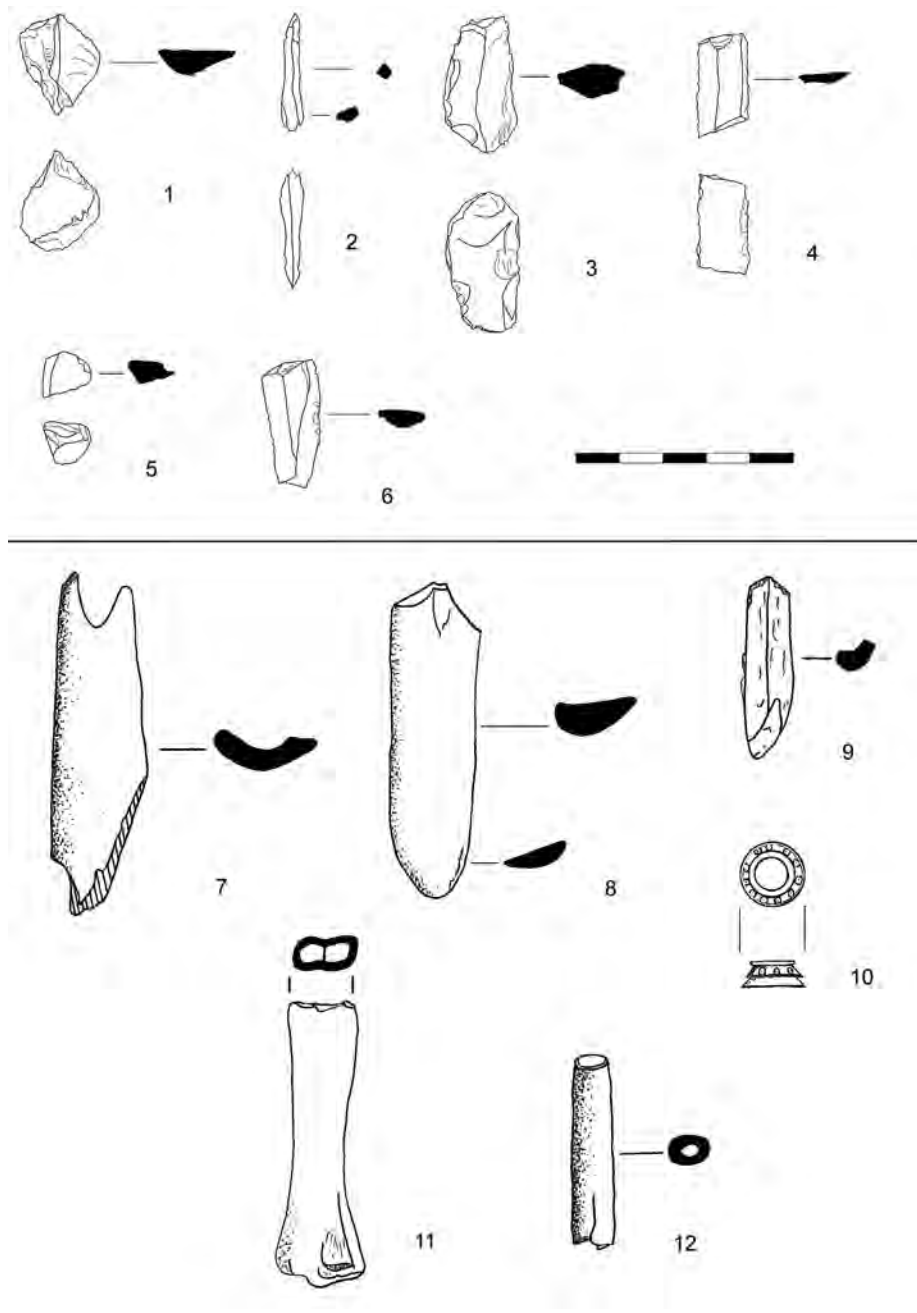

Plate 20 – Obsidian: **1**: Op. 300 str. 1c (EBA); **2-3**: Op. 100 str. 7 (mixed); **4**: Op. 100 str. 11 (LC1-2); **5**: Op. 300 str. 1f/2 (LC1-2); **6**: Op. 100 str. 10 (LC1-2). Worked bone fragments: **7-10**: Op. 100 str. 4b (EBA); **11**: Op. 300 str. 1a (EBA or surface); **12**: Op. 100 str. 13a (LC1-2).

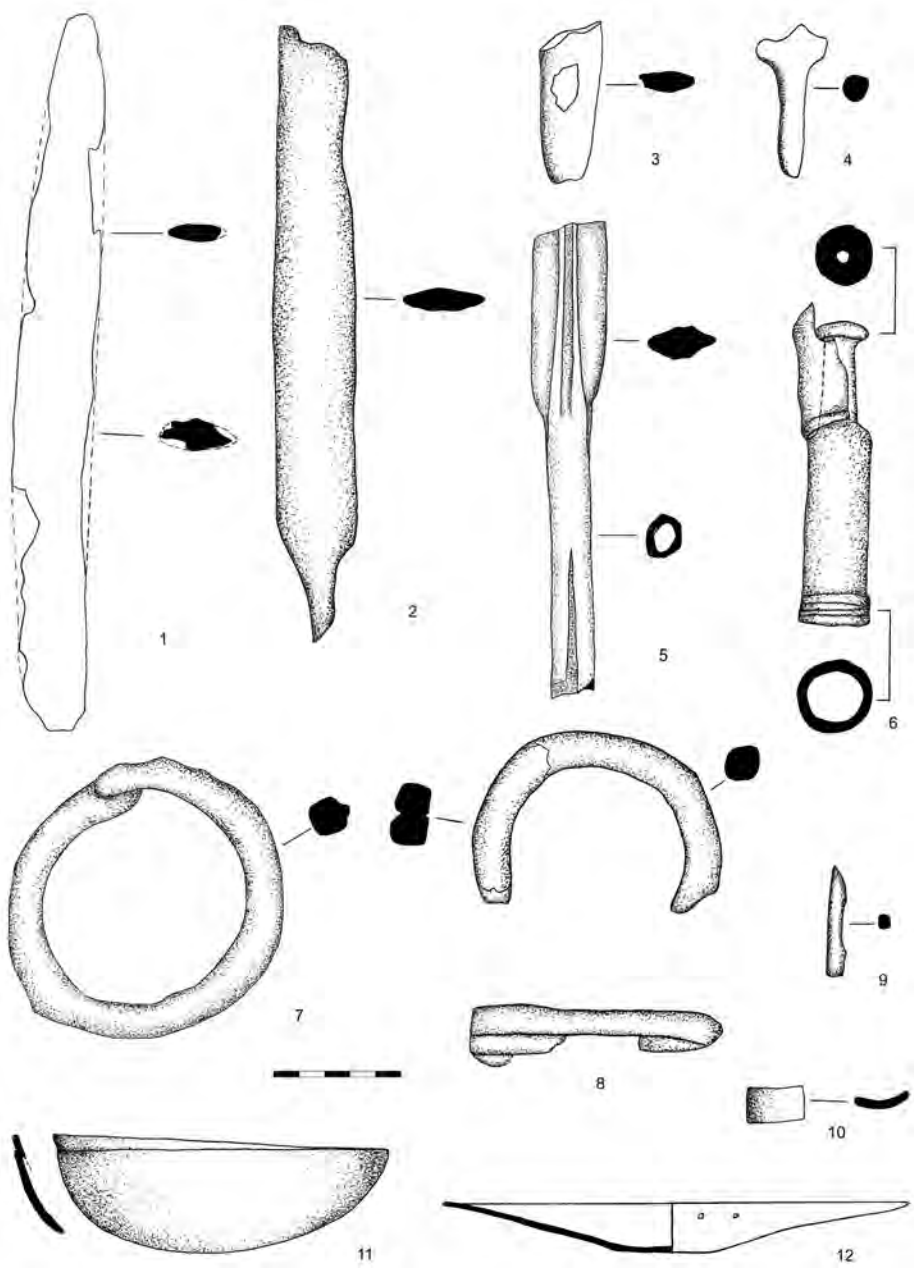

Plate 21 – Metal finds from Iron Age Burial 4 (Op. 100): **1-3**: iron blades; **4**: iron tang of a blade; **5**: iron spearhead; **6**: bronze "situla stand"; **7-8**: iron armlets; **9**: iron pin; **10**: iron "curved strip"; **11-12**: bronze bowls.

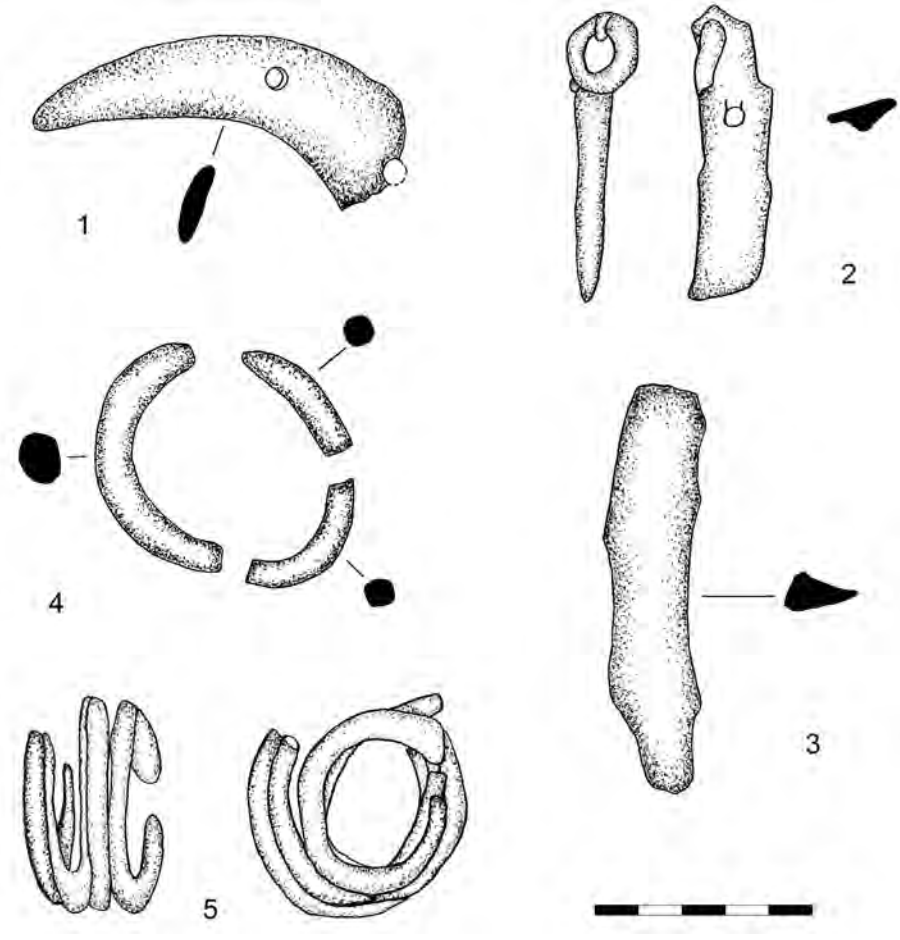

Plate 22 – Additional metal finds: **1**: iron tang of a sickle (Op. 100 str. 2 modern or Middle Islamic); **2**: iron blade fragment with rivet and tang, and traces of wood (Op. 200); **3**: iron blade fragment with tang (Op. 200); **4**: three fragments of an iron bracelet (Op. 300 top soil); **5**: iron bracelets (Op. 300 Iron Age child burial).

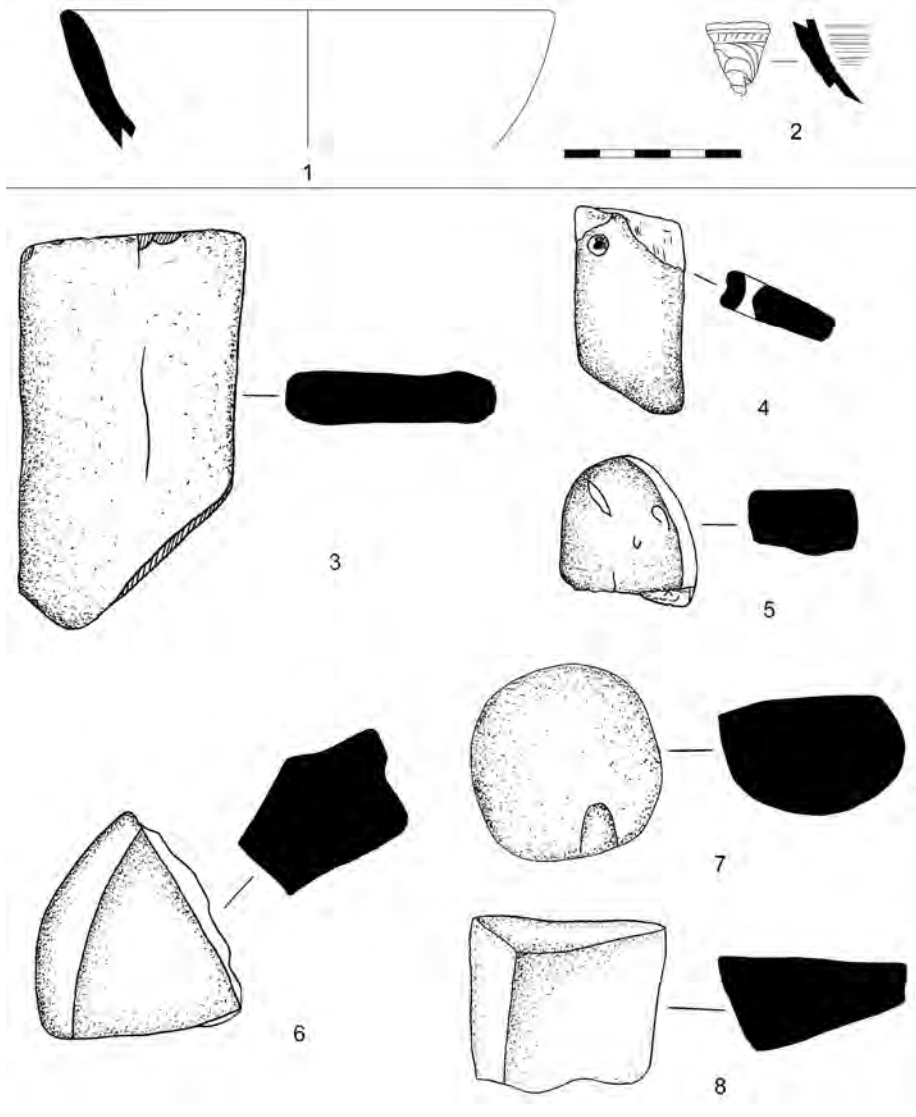

Plate 23 – Worked stone objects: **1**: gabbro stone bowl (Op. 100 str. 4c; EBA); **2**: carved chlorite stone bowl (Op. 200 str. 3); **3**: chert whetstone (Op. 100 str. 6; EBA); **4**: green stone whetstone (Op. 100 str. 2; mixed or Middle Islamic); **5**: rubbing stone (Op. 300 str. 1c; EBA); **6**: basalt quern fragment (Op. 100 str. 4c; EBA); **7**: dolerite (?) rubbing stone fragment (Op. 300 str. 4; Early Chalc.); **8**: pumice (?) grinding stone fragment (Op. 100 str. 8b; EBA).

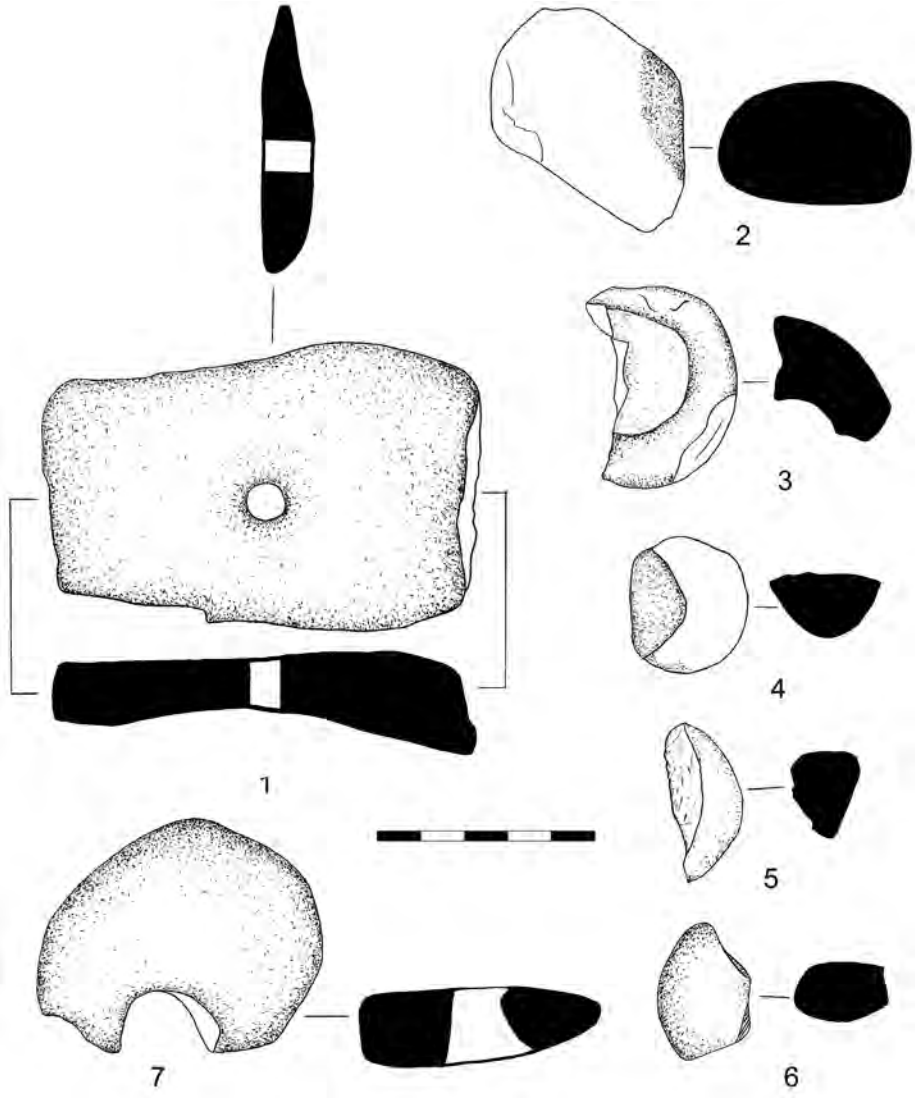

Plate 24 – Ground stone objects: **1**: metamorphic pierced stone slab (Op. 100 str. 4a; EBA); **2**: limestone rubbing stone (Op. 100 str. 8b; EBA); **3**: calcitic limestone mortar (Op. 100: str. 11; LC1-2); **4-5**: diorite rubber stone fragments (Op. 300 str. 3a; LC1-2); **6**: limestone rubbing stone fragment (Op. 200 str. 2); **7**: magmatic perforated stone (Op. 100 str. 11; LC1-2).

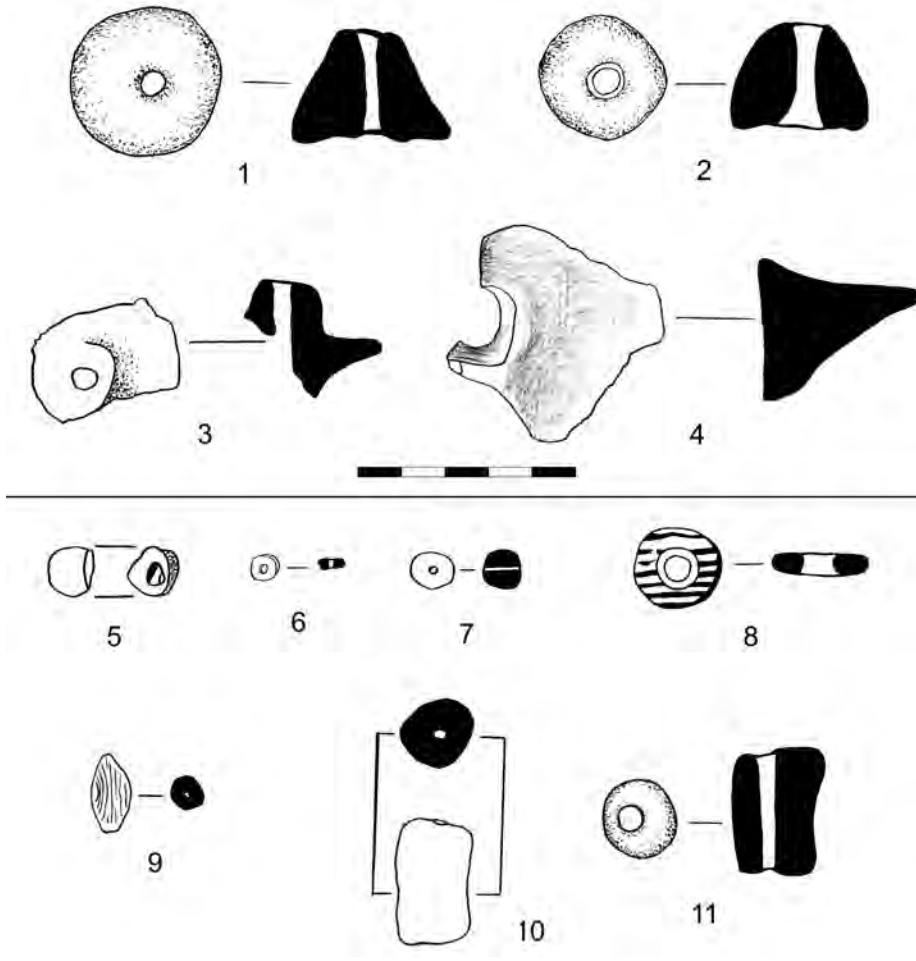

Plate 25 – Spindle whorls and beads: **1-2**: conical, baked clay spindle whorls (Op. 300 str. 3b & Op. 100 str. 11; LC1-2); **3-4**: baked clay 'wheels' (Op. 100 str. 4b & Op. 300 str. 1c; EBA); **5**: blue glazed bead (Op. 100); **6**: limestone (?) flat disk bead (Op. 100 8b; EBA); **7**: baked clay flat disk bead (Op. 300 str. 1c; EBA); **8**: pierced BOB painted sherd / flat disk bead (Op. 300 str. 4; Early Chalc.); **9**: limestone (?) barrel bead (Op. 100 str. 4c; EBA); **10-11**: baked clay cylindrical beads (Op. 300 str. 1c & Op. 100 str. 4b; EBA).

Table 17 – Plate 26

	findspot			seal type	material	dimensions		motif description	parallels
	context	stratum	period			length	width		
1	102	100 - str. 2	Islamic	cylinder	?	3,2	1,7	incised lines and dots	Chogha Maran: 341-6; 111-1
2	173	100 - str. 9	EBA	cylinder	shell	2,2	0,3	herringbone pattern	Susa: Delaporte 1920: Pl. 13:9-12 Gubba VII: Ii 1988: Pl. 11:85 Diyala: Frankfort 1955: Pls. 17:164, 29:286 Suleimeh: Al-Gailani Werr 1992: no. 6 Chogha Maran: 312-10 (MISC); 111-2 (GSS)
3	400	100 - str. 13a	LC1-2	stamp	stone	2,7	2,9	irregular net motif	Susa: Amiet 1972: Pl. 1:162
4	153	100 - str. 6	EBA	cylinder	baked clay	1,5	1,3	CMS?	
5	313-1	300 - str. 1c	EBA	cylinder	baked clay	2,2	1,7	incised crossed lines	Susa: Amiet 1972: Pl. 95:860; Delaporte 1920: Pl. 19:13 Kheit Qasim: Forest 1980: Fig. 8 Suleimeh: Al-Gailani Werr 1992: no. 5 Khafajah Sin IV: Frankfort 1955: Pl. 16:157 Ur: Wiseman 1962: Pl. 12:e Chogha Maran: 312-6

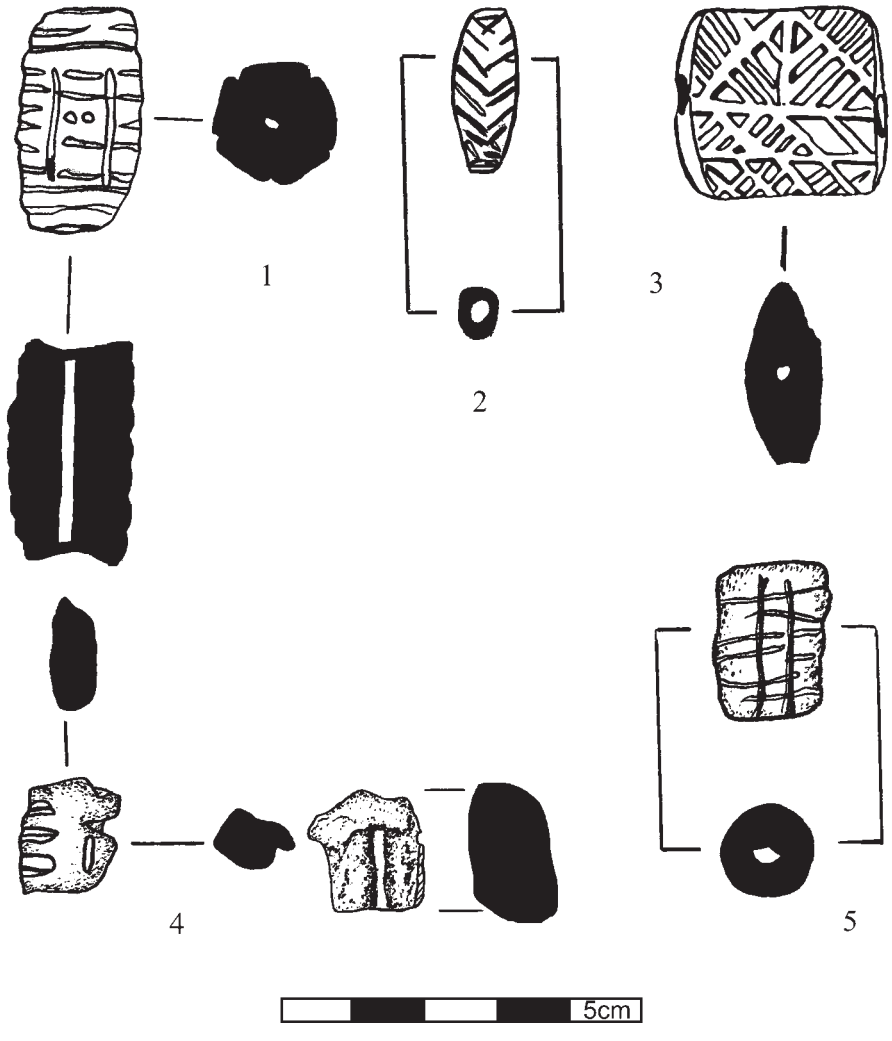

Plate 26 – Stamp and cylinder seal drawings.

Table 18 – Plate 27

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	116-2	100 - str. 3	Iron Age	1,4	1,9	0,4	1	two partially preserved impressions of a round seal with a cross with chevrons between the arms	imprints of fine straw, smooth near the top and bottom edges	wall sealing?	Susa I: Steve and Gasche 1971: Pl. 37:22; Amiet 1972: no. 158 Farukhabad (Farukh phase): Wright 1981: Fig. 29d Gawra XII-XI: Rothman 2002: Fig. 27.448, Pl. 36:1059 Dehsavar: Pollock et al. 2020: Fig. 2a Seh Gabi VII: Henrickson 1988: Fig. 3: SG73-180, Pl. II:A-B Giyan V: Contenau & Ghirshman 1935: Pl. 38:41,44 Sialk III:6: Ghirshman 1938: Pl. 86:417
2	153-34	100 - str. 6	EBA	1,8	2,1	0,5	1	poorly preserved impression of a square (?) seal with a cross with chevrons between the arms	adhered mud plaster with heavy straw temper	wall sealing	Susa I: Amiet 1972: Pl. 52:253 Hissar IC: Rashad 1990: Pl. 10: nos. 433,435
3	337-1	300 - str. 2	LC1-2	3,7	2,3	0,7	1	two partially preserved impressions of a round (lenticular) seal with a cross with lines between the arms	flat surface with traces of heavy straw (probably mud plaster)	wall sealing?	Susa: Delaporte 1920: Pl. 16:2; Amiet 1972: Pl. 40:68 Bakun: Langsdorff & McCown 1942: Pl. 8:5 Hakalan: Haerinck & Overlaet 1996: Pl. 76:2 Gawra XI/XA: Rothman 2002: Pl. 44:1587
4	308-12	300 - str. 1b	EBA	2,5	2,3	0,9	1	partially preserved impression of a square seal with geometric designs edge of impression of a round seal	flat rough surface without any identifiable imprints	receipt	none found
5	160-1	100 - str. 7	?	3,2	2,4	0,7	1	one impression of a square seal with two opposite toothed lines separated by a diagonal line edges of another impression?	oval shape, smooth, without any identifiable imprints	receipt	Giyan: Rashad 1990: Pls. 4:151, 5:155 Gawra XIA/B: Rothman 2002: Pl. 37:1085
6	358-2	300 - str. 4	EC	4	2,6	0,9	1	partially preserved impression of a square or triangular seal with a net motif	flat rough reverse without any identifiable imprints	receipt	Gawra XII-XIA/B: Rothman 2002: Pls. 29:485, 35:971 Giyan: Rashad 1990: Pl. 5:178 Girairan (Luristan): Rashad 1990: Pl. 8:368,369
7	361-1	300 - str. 5	EC	5	4	1,5	1	partially preserved impression of a triangular seal with simple geometric design (lines)	flat rough reverse, without any identifiable imprints	receipt	Susa: Amiet 1972: Pl. 52:254 Sialk: Vidale et al. 2018: Fig. 26 (right) Bakun: Langsdorff & McCown 1942: Pl. 82:7 Giyan: Caldwell 1976: no. 134

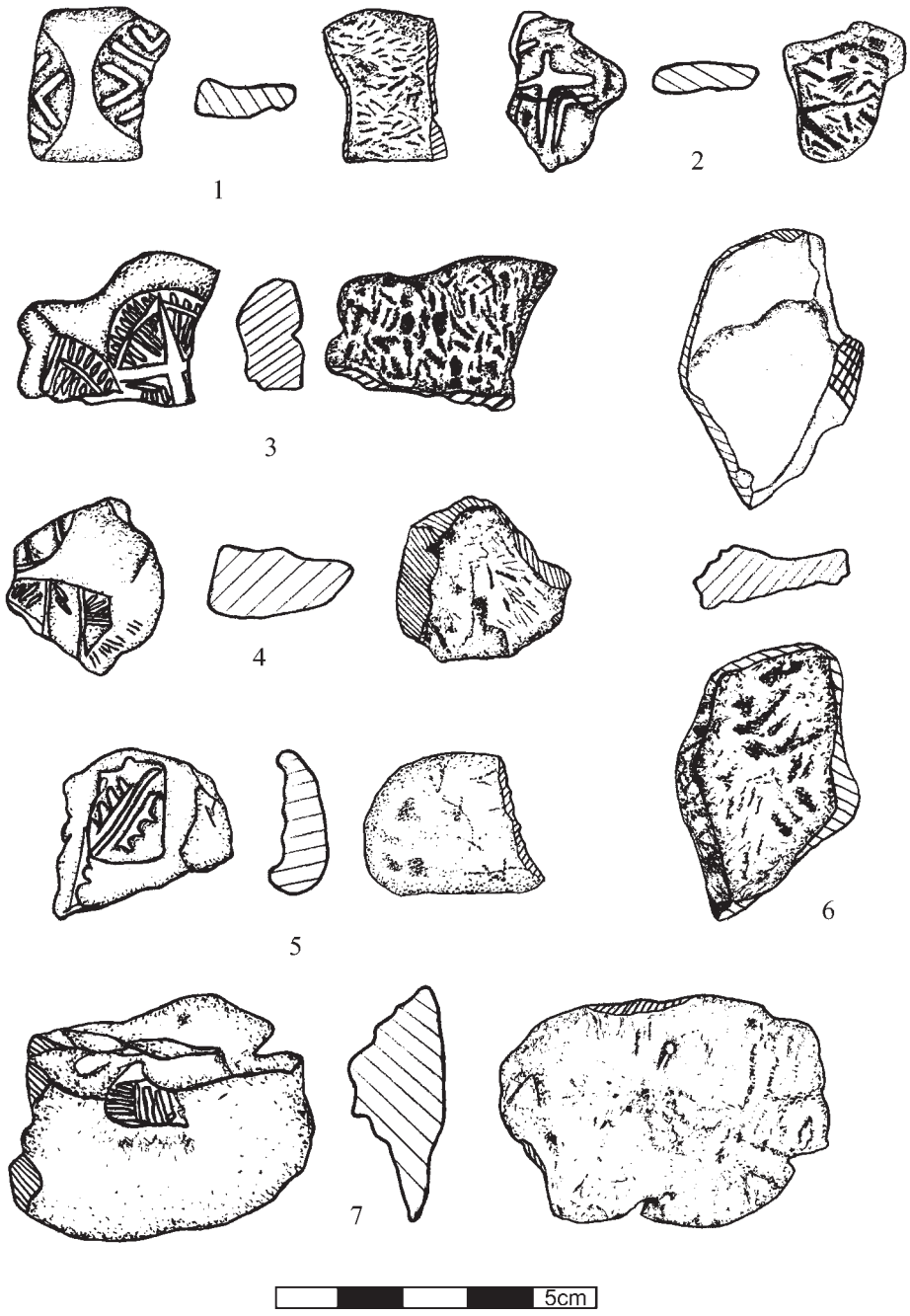

Plate 27 – Reconstructed drawings of clay sealings with stamp seal impressions with geometric designs.

Table 19 – Plate 28

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	358-1	300 - str. 4	EC	4	3,1	0.4–1.2	1	impression of a round (lenticular) seal with elaborate geometric design (lines and dots) two partially preserved impressions of the same seal	two surfaces at a right angle: a flat smooth base and an irregular surface with imprint of a S-twist cord, 2 mm in diameter	door sealing	Surkhdum-i Luri: Schmidt 1989: Pl. 77:3 Sialk III:6: Girshman 1938: Pl. 86: s.129 Giyan VD: Contenau & Ghirshman 1935: Pl. 35:2
2	333-1	300 - str. 1f	EBA	4,8	4,2	1,2	3	poorly preserved impression of a round seal with an illegible design	two strings of cord, hairy texture, 6 mm in diameter; leather imprints	bag sealing	none found
3	153-17	100 - str. 6	EBA	3,4	1,1	0,9	2	partially preserved impression of a round seal with a stylized horned animal partially preserved impression of a different round seal; stylized horned (?) animal	a string of cord (S-twist) 3 mm in diameter; fold imprints of a leather (?) cover	jar sealing	Susa I: Amiet 1973: Pl. 2:1 Giyan: Caldwell 1976: nos. 100, 103-104
4	341-7	300 - str. 2	LC1-2	2,8	1,7	0,55	3	poorly preserved impression of a square seal with an illegible design (includes dots)	flat surface without any identifiable imprints	illegible	none found
5	341-5	300 - str. 2	LC1-2	1,8	1,2	0,8	3	poorly preserved impression(s?) of a square seal with an illegible design	irregular surface without any identifiable imprints	illegible	none found

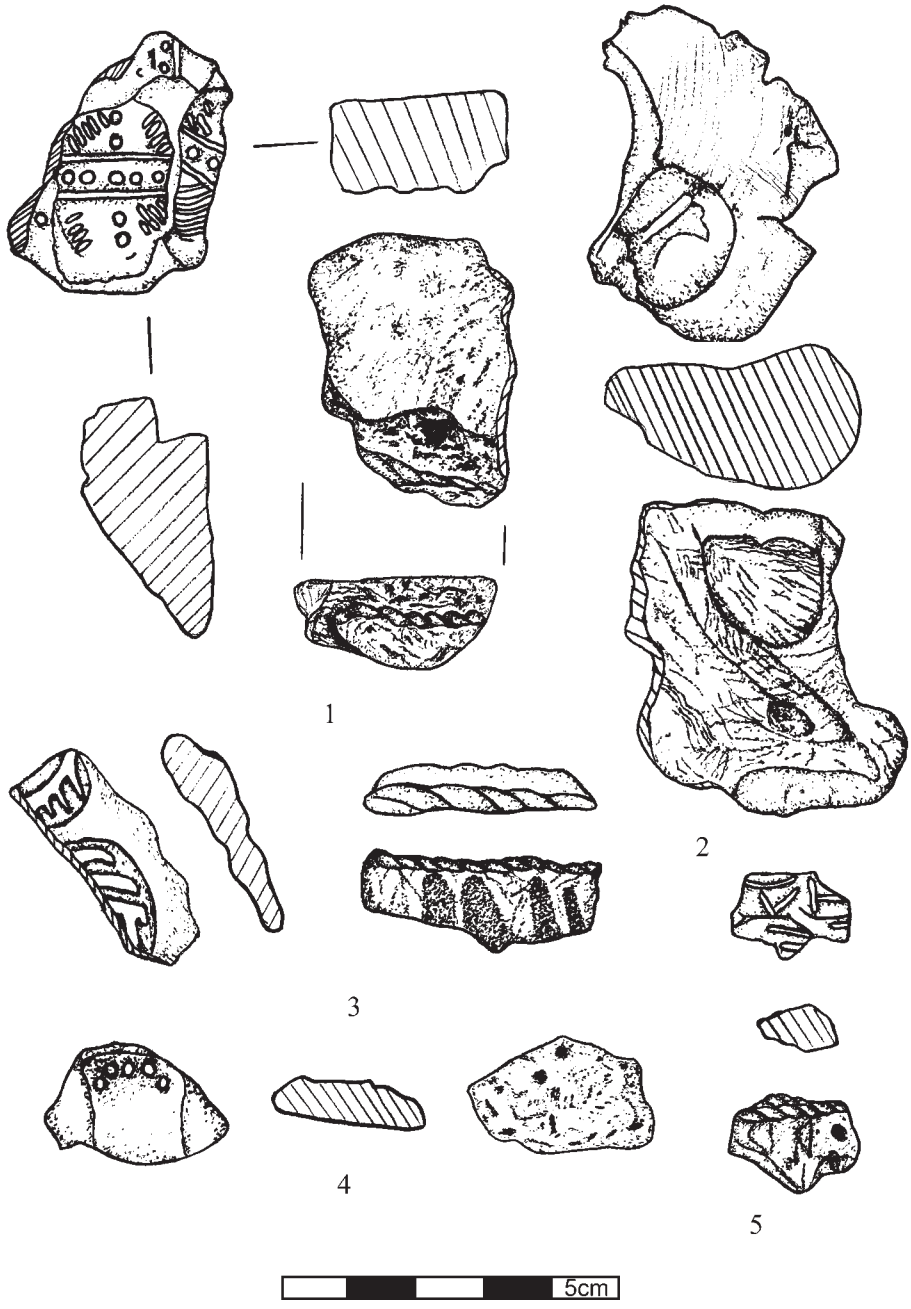

Plate 28 – Reconstructed drawings of clay sealings with stamp seal impressions with geometric design (1), animal motif (3), and illegible designs (2,4-5).

Table 20 – Plate 29

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	129-1	100 - str. 4b	EBA	1,3	2	0,35	CMS - 1	individual animal?	flat smooth surface without any identifiable imprint	indeterminable	Kani Shaie: Renette 2018: Fig. V.61b-c
2	153-23	100 - str. 6	EBA	2	0,7	0,4	CMS - 1	individual animal?	smooth hollow (chamfered corner of a container, probably a wooden box covered by a piece of leather)	box sealing?	Kani Shaie: Renette 2018: Fig. V.61c
3	153-11	100 - str. 6	EBA	1,8	1,5	0.3-0.7	CMS - 1	individual animal?	smooth body and rim of a vessel (sealing covered rim and lid)	jar sealing	none found
4	153-26	100 - str. 6	EBA	1,7	1,4	0,4	CMS - 1	individual animal?	imprint of three strings of hairy cord, Z-twist 3 mm in diameter	jar sealing	Kani Shaie: Renette 2018: Fig. V.61b-c
5	153-42	100 - str. 6	EBA	1,8	1,4	0,9	CMS - 1	individual animal?	waterworn sealing; two surfaces at a right angle; two cord imprints	indeterminable	Ahmad al-Hattu: Sürenhagen 2011: Fig. 20.1
6	308-11	300 - str. 1b	EBA	1,7	1,8	0,5	CMS - 1	individual animal?	irregular granulated surface	indeterminable	Kani Shaie: Renette 2018: Fig. V.61b-c Kish: Buchanan 1966: Pl. 6:80
7	153-45	100 - str. 6	EBA	2,8	1,6	0,6	CMS - 1	individual animal?	two cord imprints, one S-twist 6 mm in diameter, the other Z-twist 6 mm in diameter; folds of a smooth cover (leather?)	jar sealing	Ahmad al-Hattu: Sürenhagen 2011: Fig. 20.1
8	320-10	300 - str. 1f	EBA	1,9	1,8	0.4–0.9	CMS - 1	individual animal?	mud plaster adhered on the back	wall sealing	Kani Shaie: Renette 2018: Fig. V.61b-c
9	312-3	300 - str. 1c	EBA	1,5	1,5	0,7	CMS - 1	individual animal	irregular surface without any identifiable imprint	indeterminable	none found
10	316-3	300 - str. 1d	EBA	2,2	1,5	0,6	CMS - 1	individual animal	smooth surface with fingerprint	indeterminable	Chogha Maran: 308-10 Kani Shaie: Renette 2018: Fig. V.61b-c
11	308-5	300 - str. 1b	EBA	2,1	2,5	1,1	CMS - 1	individual animal	mud plaster tightly adhered on the back of the sealing	wall sealing	Kani Shaie: Renette 2018: Fig. V.61b

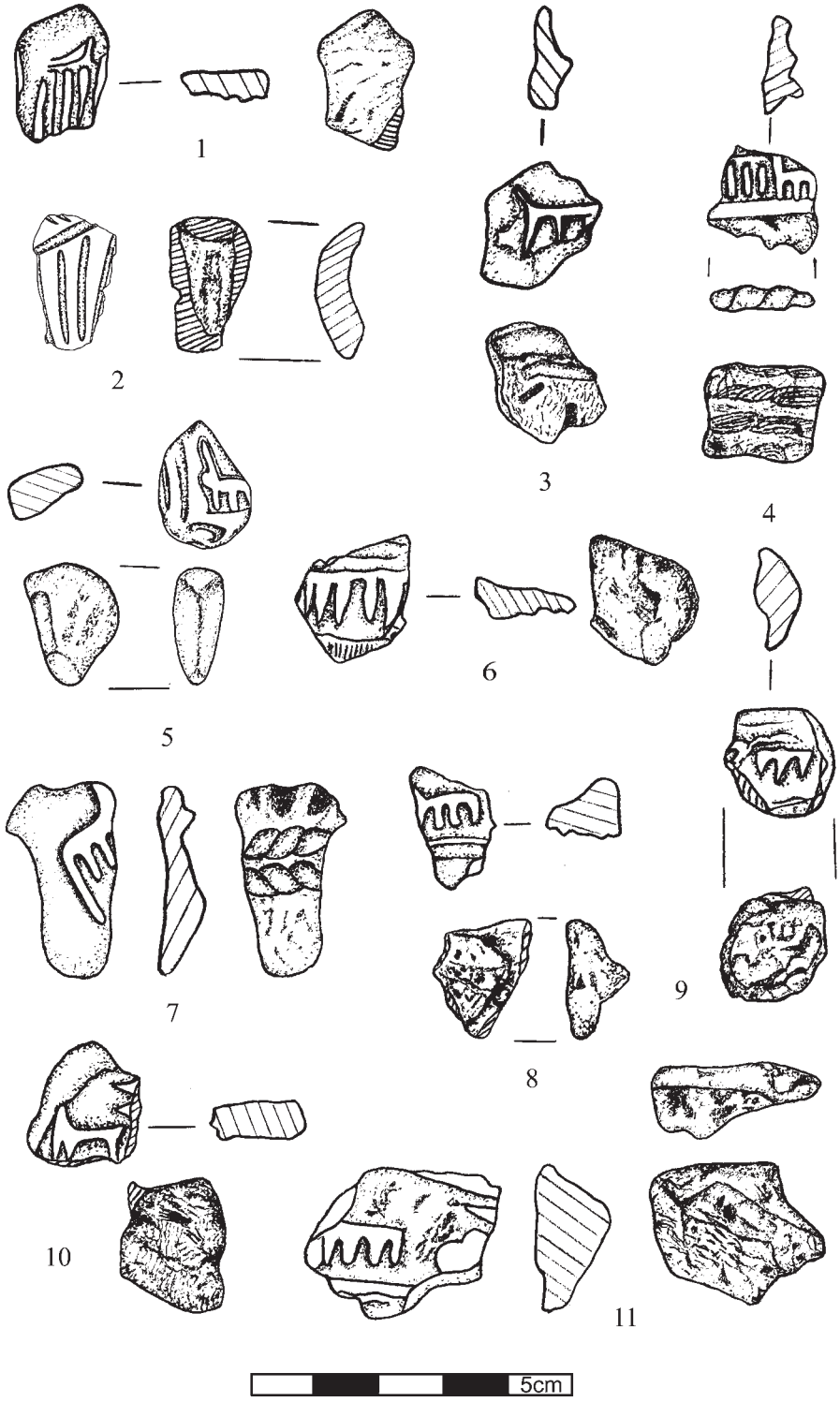

Plate 29 – Reconstructed drawings of clay sealings with cylinder seal impressions with animal motifs (CMS Type 1).

Table 21 – Plate 30

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-7	100 - str. 6	EBA	2	3,9	0,9	CMS - 2	animal file; tête bêche	two strings of same hairy cord; S-twist 2 mm in diameter; folds of a smooth cover (?)	jar sealing	none found
2	153-10	100 - str. 6	EBA	2,4	2,6	1	CMS - 2	animal file; tête bêche	two strings of same cord; S-twist 5 mm in diameter; leather cover	bag sealing?	Kani Shaie: Renette 2018: Fig. V.61b-c Kish: Buchanan 1966: Pl. 6:80
3	153-13	100 - str. 6	EBA	3,2	2,8	0,6	CMS - 2	animal file; tête bêche	a few strings of cord; Z-twist 3 mm in diameter; leather cover	jar sealing	Ahmad al-Hattu: Sürenhagen 2011: Fig. 20.1 Kani Shaie: Renette 2018: Fig. V.61b-c Megiddo (Levant): Ben-Tor 1978: Fig. 6.42
4	153-15	100 - str. 6	EBA	2,1	3,3	0,6	CMS - 2	two opposite animals sharing a single body	oval, flat sealing with heavy straw-tempered mud plaster adhered on the back	wall sealing	none found
5	153-24	100 - str. 6	EBA	4,5	2,6	0,6	CMS - 4	laden animal	oval flat sealing with imprints of mud plaster	wall sealing	none found
6	312-9	300 - str. 1c	EBA	2,3	2,4	0,4	CMS - 2	two animals sharing a single head?	very smooth rounded edge (attached below the rim of a jar); irregular surface with a string of cord: S-twist 5 mm in diameter	jar sealing	none found
7	153-9	100 - str. 6	EBA	2,1	2,2	0,4	CMS - 4	laden animal	part of an oval sealing; irregular surface with poorly preserved imprints of mud plaster?	wall sealing?	none found

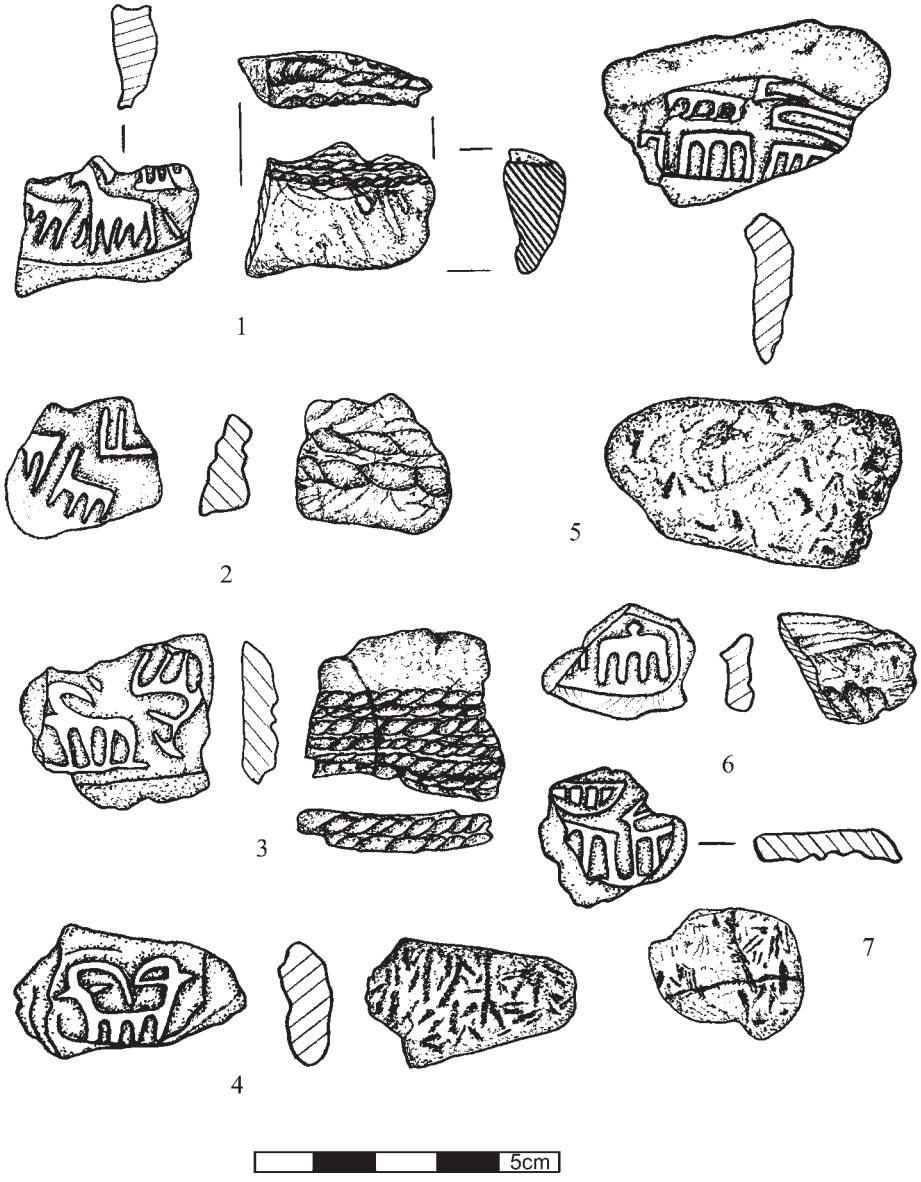

Plate 30 – Reconstructed drawings of clay sealings with cylinder seal impressions with animal motifs (CMS Type 2-4).

Table 22 – Plate 31

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-14	100 - str. 6	EBA	3,5	3	1,4	CMS - 3	animal motif with plough symbol?	square sealing with smooth reverse and mud plaster adhered on the back	wall sealing	none found
2	302-4	300 - str. 1a	EBA	2	2	0,6	CMS - 3	animal motif with plough symbol?	smooth reverse, without any identifiable imprints, except for a fingerprint	indeterminable	none found
3	308-3	300 - str. 1b	EBA	2,2	1,8	1,3	CMS - 3	animal motif with plough symbol?	mud plaster containing heavy straw adhered on the back of the sealing	wall sealing	none found
4	313-6	300 - str. 1c	EBA	1,7	1,8	0,4	CMS - 3	animal motif with plough symbol?	irregular surface without any identifiable imprints	indeterminable	none found
5	302-3	300 - str. 1a	EBA	2,1	2,1	0,6	CMS - 2	animal file	two strings of cord; Z-twist 3 mm in diameter, made of three yarns; folds of a leather cover?	jar sealing	Ahmad al-Hattu: Sürenhagen 2011: Fig. 20.1
6	308-10	300 - str. 1b	EBA	2,2	2	0,8	CMS - 2	two animals looking in different directions	parallel strings of cord with a diagonal string behind them; Z-twist 3 mm in diameter; half knotted?	jar sealing	Kani Shaie: Renette 2018: Fig. V.61c Kish: Buchanan 1966: Pl. 6:80
7	331-1	300 - str. 1d	EBA	3	2,6	0,7	CMS - 2	animal file	five strands of overlapping, interwoven, smooth branches (wickerwork?)	basket sealing?	none found
8	318-6	300 - str. 1e	EBA	2,7	3,6	0,6	CMS - 4	laden animal?	oval shape; flat, smooth surface with a few small pieces plaster preserved	wall sealing	none found
9	313-3	300 - str. 1c	EBA	2,3	2,4	0,5	CMS - 2	animal file	two strings of cord; Z-twist 3 mm in diameter; fold of a smooth leather cover?	jar sealing	Kish: Buchanan 1966: pl. 6, n. 80 Varzaneh site 051: Rafiee Alavi et al. 2021: Fig. 6

Plate 31 – Reconstructed drawings of clay sealings with cylinder seal impressions with animal motifs (CMS Type 2-4).

Table 23 – Plate 32

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	312-8	300 - str. 1c	EBA	4	2,2	0,9	CMS - 4	laden animal?	oval shape with poorly preserved pieces of mud plaster adhered on the back	wall sealing	none found
2	313-10	300 - str. 1c	EBA	3,5	1,9	0,9	CMS - 4	laden animal	part of reverse is pitted	wall sealing?	none found
3	315-10	300 - str. 1c	EBA	2,7	2,5	0,9	CMS - 3	animal motif with rayed circle	flat surface with scarce pieces of mud plaster adhered on the back	wall sealing	none found
4	316-2	300 - str. 1d	EBA	2,5	3,5	0,9	CMS - 3	animal motif with plant motif	oval shape with fingerprints and imprints of plaster	wall sealing	Khafajah Sin IV-VII: Frankfort 1955: Pls. 9:72, 23:233
5	324-1	300 - str. 1b	EBA	3	3,5	0,8	CMS - 3	animal motif with rayed concentric circles	concave shape with heavy straw-tempered mud plaster	wall sealing	Gubba VII: Ii 1988: Fig. 6.6 Susa: Delaporte 1920: Fig. 24.10

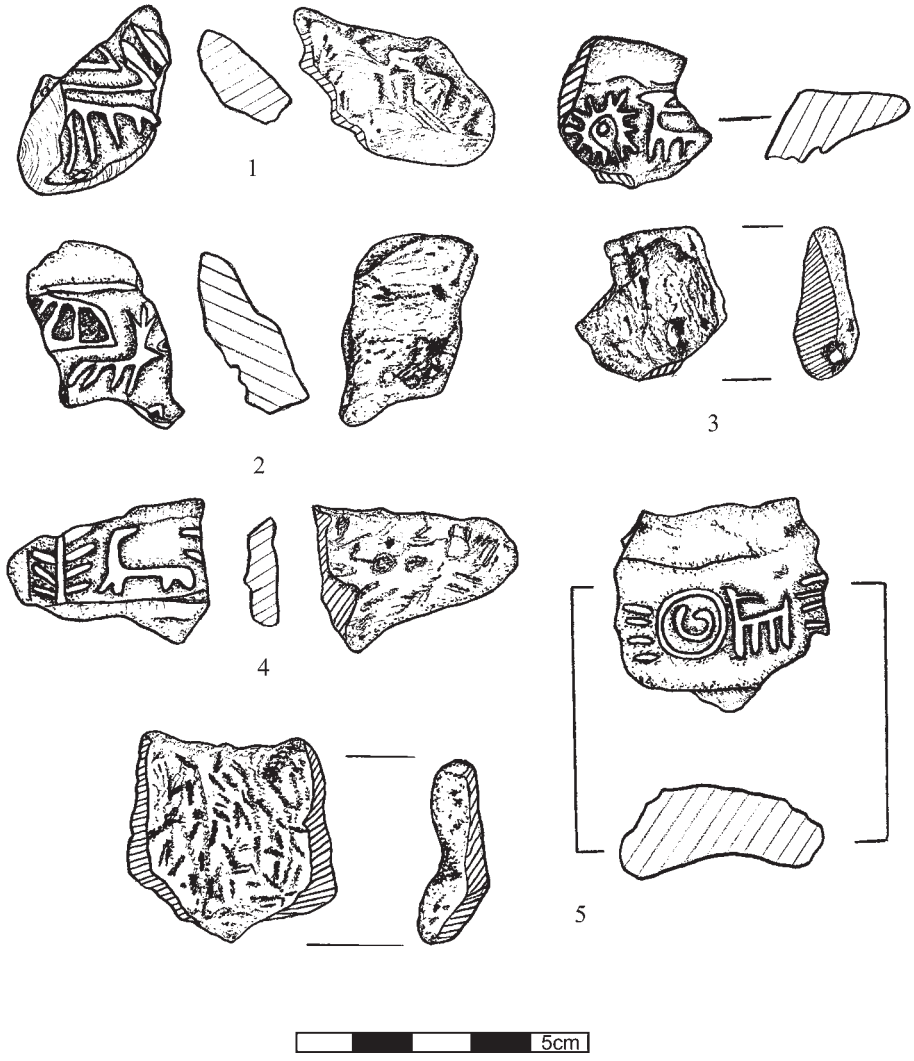

Plate 32 – Reconstructed drawings of clay sealings with cylinder seal impressions with animal motifs (CMS Type 2-4).

Table 24 – Plate 33

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-25	100 - str. 6	EBA	3,2	2,6	0,7	CMS - 5	human figure with exaggerated hands and feet	two strings of cord: Z-twist 6 mm in diameter; smooth surface (adhered to exterior of a jar without any leather or textile cover)	jar sealing	Susa: Legrain 1921: Pl. 25:230
2	308-6	300 - str. 1b	EBA	2	2,1	0,7	CMS - 6	leaping human	two strings of the same cord: Z-twist 2 mm in diameter; leather cover?	jar sealing	none found
3	313-8	300 - str. 1c	EBA	2,8	2,1	0,3	CMS - 5	human figure with exaggerated neck and shoulders and a snake (?) around the head	oval sealing; smooth surface with finger-print, the shape resembles wall sealings, but no plaster preserved	wall sealing?	none found
4	313-4	300 - str. 1c	EBA	2,7	2,8	0,4	CMS - 7	two surfaces with different seal impressions: one with human figure with a raised hand and male genitals; the other with illegible design	irregular surface with a raised part bearing the imprint of a knot of a hairy cord	indeterminable	Susa: Legrain 1921: Pl. 13:210
5	318-1	300 - str. 1e	EBA	2,4	2,8	0,4	CMS - 7	human figure with a raised hand and male genitals	flat surface with straw-tempered mud plaster	wall sealing	none found
6	321-1	300 - str. 1f	EBA	2,7	2	0,3	CMS - 8	human figure with upraised hands	horizontal narrow lines (body of a vessel?)	jar sealing?	Tell Kutan: Pittman 2019: Pl. 10.2:6
7	313-12	300 - str. 1c	EBA	2	1,7	0,6	CMS - 8	human figure with upraised hands	irregular, pitted surface	indeterminable	Suleimeh: Al-Gailani Werr 1988: Fig. 3: nos. 10,17,19-20
8	318-3	300 - str. 1e	EBA	1,5	2,1	0,4	CMS - 8	human figure shown horizontally with upraised hands	two or three strings of the same cord: Z-twist 2 mm in diameter; smooth leather cover	jar sealing	Suleimeh: Al-Gailani Werr 1988: Fig. 3: nos. 10,17,19-20 Tell Kutan: Pittman 2019: Pl. 10.2:6
9	318-11	300 - str. 1e	EBA	4,4	2	0,3	CMS - 8	two human figures shown horizontally with upraised hands arranged in tête bêche combination	flat surface with one string of cord: S-twist 3 mm in diameter; leather cover	jar sealing	Tell Kutan: Pittman 2019: Pl. 10.2:6 Nineveh: Pittman 2019: Pl. 10.5:9
10	321-2	300 - str. 1f	EBA	2,1	2,3	0,25	CMS - 8	human figure with upraised hands	thin sealing with a smooth surface without any identifiable imprints	indeterminable	Tell Kutan: Pittman 2019: Pl. 10.2:6

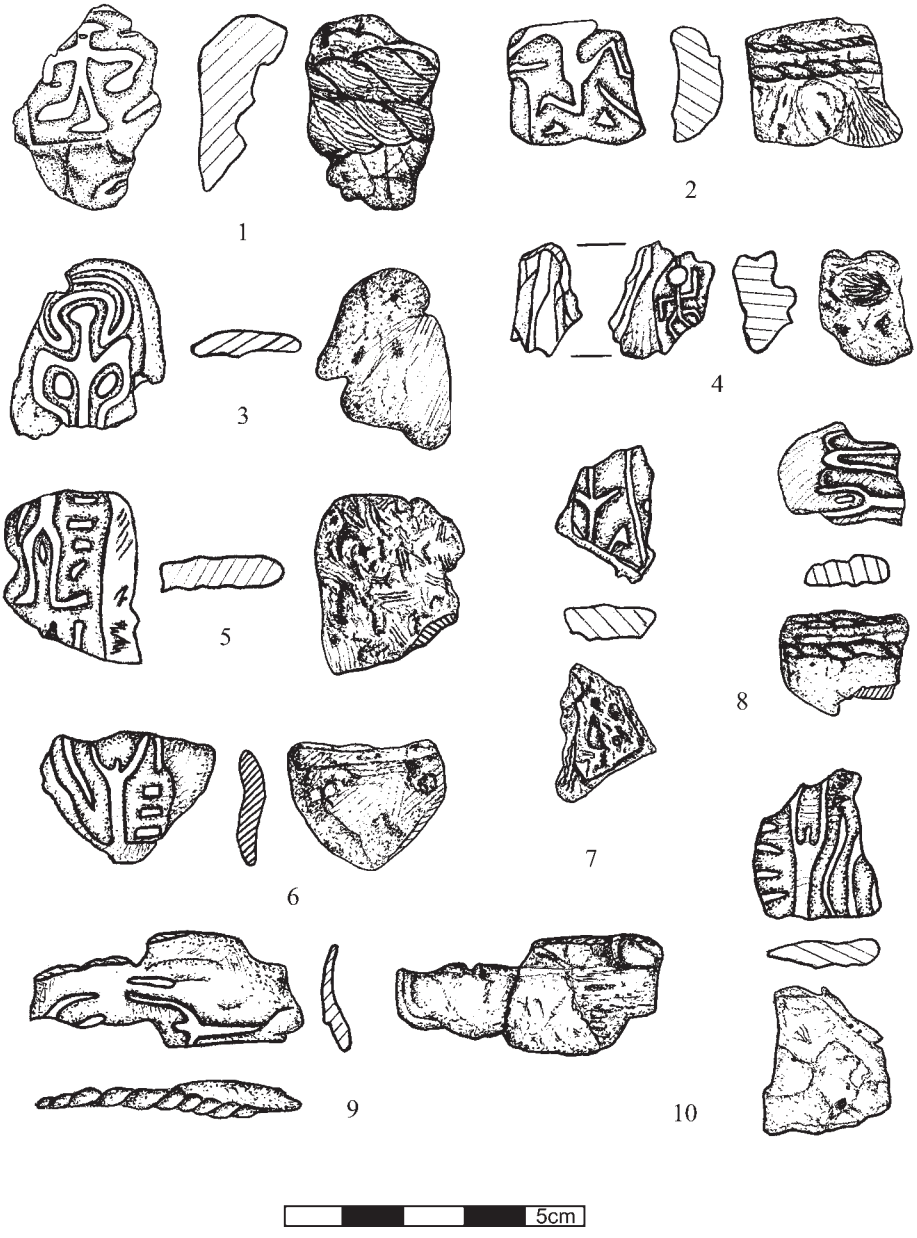

Plate 33 – Reconstructed drawings of clay sealings with cylinder seal impressions with anthropomorphic motif (CMS Type 5-8).

Table 25 – Plate 34

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-1	100 - str. 6	EBA	3,7	2	0,8	CMS - 9	concentric circles surrounded by interlocking geometric designs	flat and smooth surface with heavy mud plaster adhered on the back	wall sealing	Susa: Legrain 1921: Pl. 2:25 Gubba IV: Ii 1988: Fig. 7.24 Fara: Martin 1988: no. 129
2	153-18	100 - str. 6	EBA	3,8	2,7	0,8	CMS - 9	individual concentric circles	flat surface, partially pitted, with imprints of mud plaster	wall sealing	Susa: Legrain 1921: Pl. 2:25 Gubba IV: Ii 1988: Fig. 7.24 Fara: Martin 1988: no. 129
3	308-9	300 - str. 1b	EBA	2,2	3	0,4	CMS - 9	concentric circles surrounded by interlocking geometric designs	irregular surface without any identifiable imprints	indeterminable	Khafajah: Frankfort 1955: Pl. 39:407
4	153-4	100 - str. 6	EBA	2,3	3,5	1,9	CMS - 9	concentric circles surrounded by interlocking geometric designs	flat, smooth sealing with heavy straw-tempered mud plaster adhered on the back	wall sealing	Gubba VII-VI: Ii 1988: Fig. 13: nos. 112, 114, 115-116 Southern Levant: Ben-Tor 1978: Figs. 2.12, 3.20, 4.24
5	153-3	100 - str. 6	EBA	2,5	2	0,7	CMS - 9	concentric circles surrounded by interlocking geometric designs	flat sealing with heavy straw-tempered mud plaster adhered on the back	wall sealing	none found
6	318-5	300 - str. 1e	EBA	2	2	0.4–1	CMS - 9	concentric circles separated by simple geometric designs	very smooth surface of the body of a vessel, and a smooth hollow on the edge, probably imprints of a ceramic lid?	jar sealing	Susa: Delaporte 1920: Pl. 17.4 Ein Shahal (Levant): Ben-Tor 1978: Fig. 2.15
7	308-7	300 - str. 1b	EBA	1,8	2,7	0,4	CMS - 9	a row of concentric circles separated by a single chevron	flat surface with imprints of heavy straw-tempered mud plaster	wall sealing	Fara: Martin 1988: no. 80 Khafajah: Frankfort 1955: Pl. 36:376 Telloh: Amiet 1980: Pl. 21:357 Gubba IV: Ii 1988: Fig. 7.24 Khirbet el-Mushreifeh (Levant): Joffe 2001: Fig. 19.2, no. 2
8	313-9	300 - str. 1c	EBA	2,1	0,8	0,2	CMS - 9	concentric circles separated by a single triangle	smooth surface without any identifiable imprints	indeterminable	Me'ona (Levant): Braun 2004: Fig. 4.1
9	308-4	300 - str. 1b	EBA	2,2	3	0,4	CMS - 9	concentric circles and a comb-shape design	flat sealing with smooth reverse without any identifiable imprints, except for a fingerprint	indeterminable	Khafajah: Frankfort 1955: Pl. 39:407 Susa: Amiet 1972: Pl. 21:878
10	320-1	300 - str. 1f	EBA	1,5	1,7	1	CMS - 9	concentric circle and a comb-shape design	flat surface with mud plaster containing straw adhered on the back	wall sealing	Khafajah: Frankfort 1955: Pl. 39:407

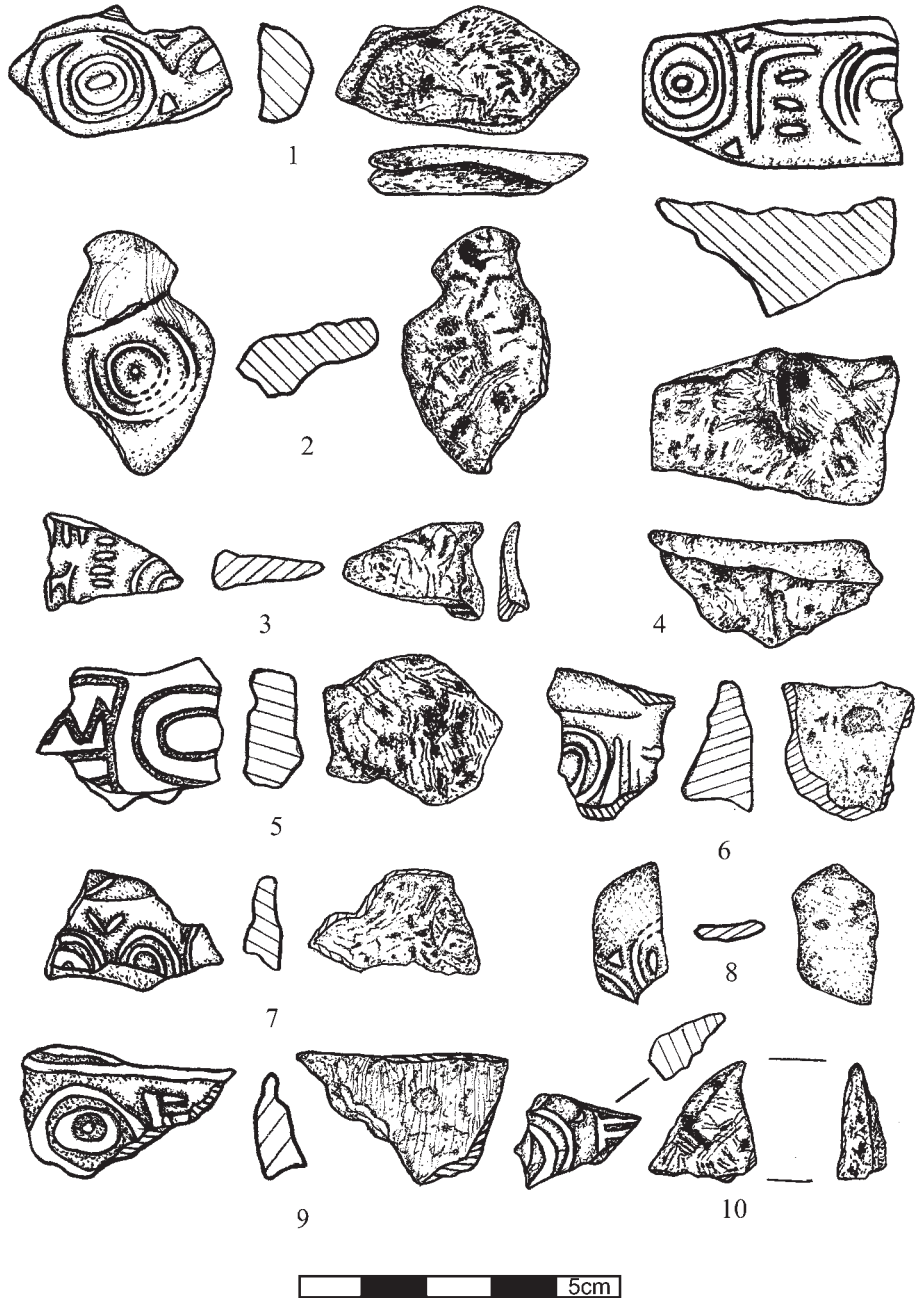

Plate 34 – Reconstructed drawings of clay sealings with cylinder seal impressions with concentric circles motif (CMS Type 9).

Table 26 – Plate 35

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-28	100 - str. 6	EBA	3,3	2	1	CMS - 9	concentric semicircles (?)	roughly cone-shaped sealing with an even and smooth base, and a negative rounded side with two strings of the same cord: Z-twist 6 mm in diameter; imprint of door peg, ca. 4 cm	door sealing	Khafajah: Frankfort 1955: Pl. 39:410 Kish: Collon 1987: Fig. 18.31 Susa: Amiet 1972: nos. 806, 832 Shar-i Sukhtah: Amiet 1983: Fig. 1f, Fig. 15 Meggido (Levant): Ben-Tor 1978: Fig. 1.1
2	318-4	300 - str. 1e	EBA	2,1	1,1	0,7	CMS - 9	concentric shapes (?) surrounded by geometric designs	cone-shaped sealing with a smooth base and two strings of the same cord on the side: Z-twist 3 mm in diameter	door sealing	Qiryat Ata (Levant): Braun 2004: Fig. 4.1
3	313-2	300 - str. 1c	EBA	3	2,5	0,9	CMS - 9	concentric rectangles surrounded by geometric designs (?)	a hollow part and a raised part, imprint of leather (?) cover in the hollow and irregular cord on the edge of the raised part	bag sealing?	Qiryat Ata (Levant): Braun 2004: Fig. 4.1
4	341-1	300 - str. 2	EBA?	2,4	2,5	0,4	CMS - 10	rayed circle encompassing a small circle; sun motif	irregular surface without any identifiable imprints	indeterminable	Buchanan 1981: no. 227 Susa: Legrain 1921: Pl. 15:230
5	308-2	300 - str. 1b	EBA	1,7	1,7	0,4	CMS - 10	rayed circle encompassing a dot; sun motif	smooth surface with fingerprint impression, without any identifiable object or cord	indeterminable	Susa: Legrain 1921: Pl. 15:230
6	332-1	300 - str. 2	EBA?	1,9	1,4	1,2	CMS - 10	rayed circle encompassing a dot; sun motif	flat rough surface without any identifiable imprints	indeterminable	Susa: Legrain 1921: Pl. 15:230
7	302-2	300 - str. 1a	EBA	1,6	1,3	0,5	CMS - 10	rayed circle encompassing a dot; sun motif	smooth surface with a fingerprint impression, without any identifiable imprints	indeterminable	Buchanan 1981: no. 227 Susa: Legrain 1921: Pl. 15:230

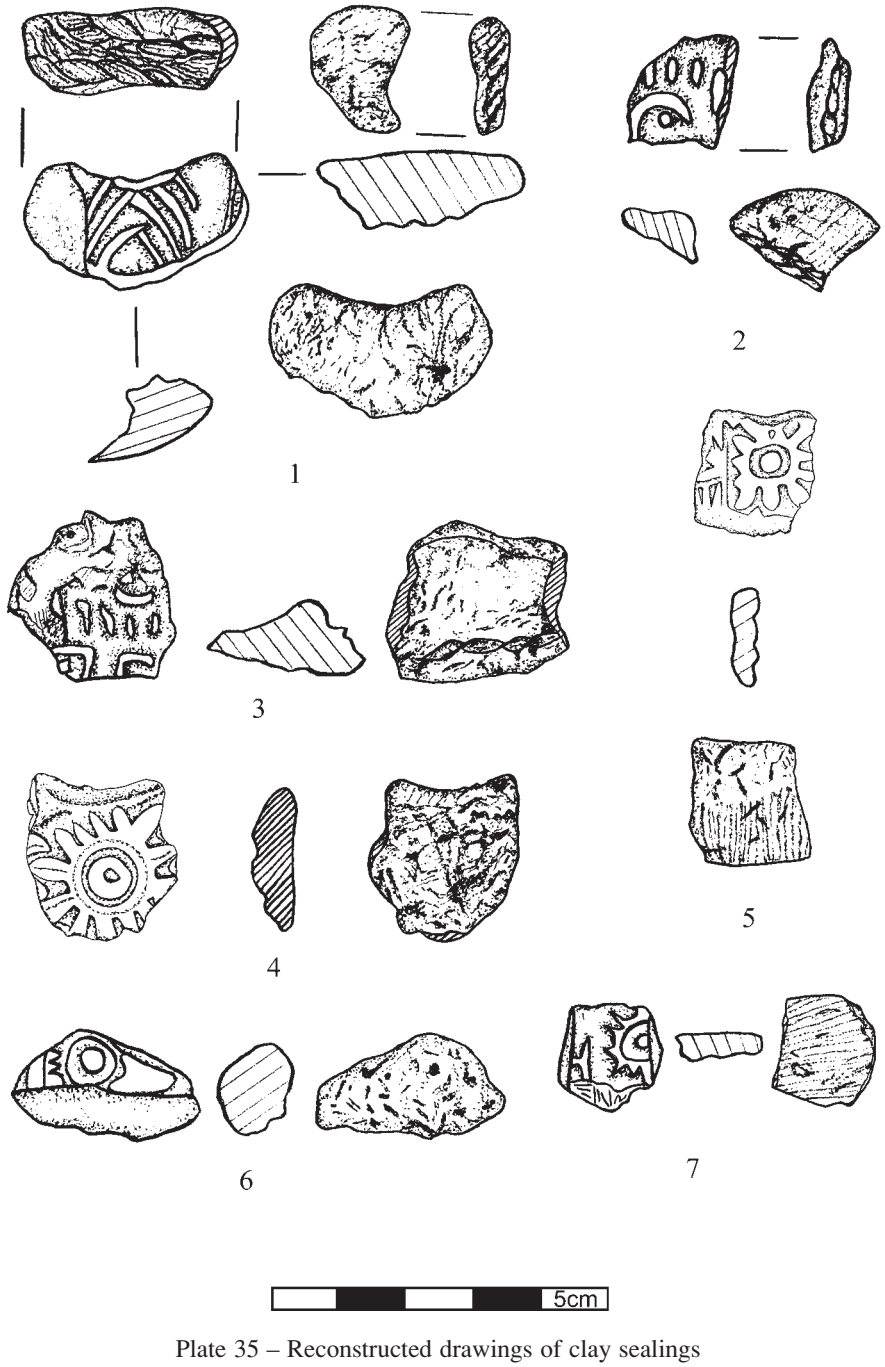

Plate 35 – Reconstructed drawings of clay sealings
with cylinder seal impressions with concentric shapes (1-3; CMS Type 9)
and rayed circles (4-7; CMS Type 10) motifs.

Table 27 – Plate 36

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	111-3	100 - str. 4a	EBA	3,7	3	0.5–1.7	CMS - 11	geometric designs within square boxes	square sealing with a flat, smooth reverse with heavy mud plaster adhered on the back	wall sealing	none found
2	153-5	100 - str. 6	EBA	2,9	1,8	0,5	CMS - 11	concentric circles within square box	irregular hollow with two strings of the same cord: Z-twist (?) 3 mm in diameter	bag sealing?	none found
3	312-2	300 - str. 1c	EBA	1,6	2,2	0,5	CMS - 11	rayed circle within rectangular box	two strings of the same cord: Z-twist 3 mm in diameter; leather cover	jar sealing	Buchanan 1981: no. 227
4	313-1	300 - str. 1c	EBA	2,7	2,8	1,2	CMS - 11	horizontal human figure within a square box	cone-shaped sealing with smooth base; two strings of the same cord: S-twist 5 mm in diameter	door sealing	Tell Kutan: Pittman 2019: Pl. 10.2:6
5	153-30	100 - str. 6	EBA	2,9	2,7	0,5	CMS - 11	poorly preserved: dots within square boxes?	square sealing with a flat, smooth reverse with few tiny pieces and imprints of plaster (?)	wall sealing?	none found
6	111-1	100 - str. 4a	EBA	3,3	1,6	0,5	CMS - 11	poorly preserved: dots within square boxes?	relatively flat and smooth base, imprints of two strings of cord on the side: S-twist 5 mm in diameter	door sealing?	none found
7	341-6	300 - str. 2	EBA?	2,5	2,6	0,7	CMS - 11	lines within square boxes	two strings of the same cord, probably knotted; imprints of the folds of a cover	jar sealing?	Buchanan 1981: no. 231
8	308-1	300 - str. 1b	EBA	1,9	1,7	0,8	CMS - 11	poorly preserved: dots or lines within square boxes?	three strings of overlapping smooth straps (probably wickerwork) and a vertical string of hairy cord (probably through a hole in the basket lid and knotted)	basket sealing?	Buchanan 1981: no. 231

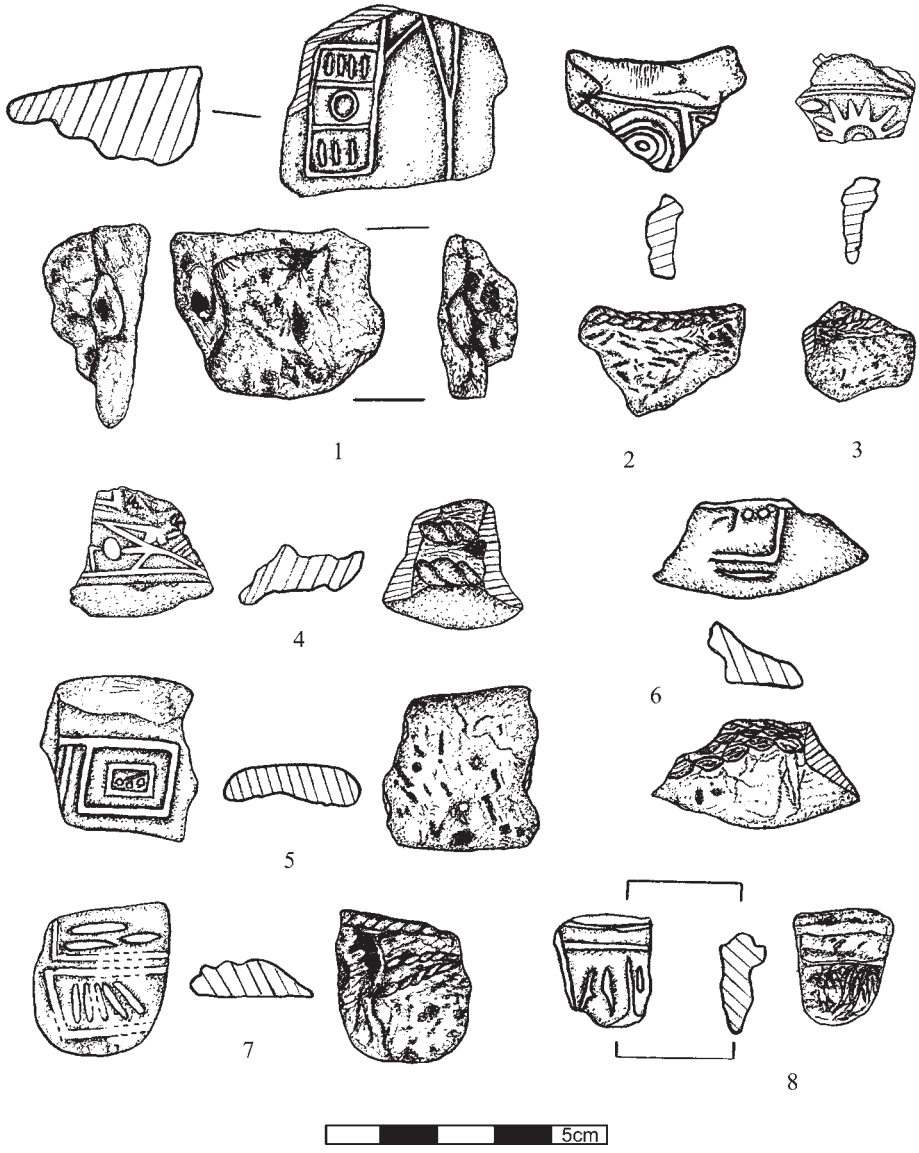

Plate 36 – Reconstructed drawings of clay sealings
with cylinder seal impressions with CMS Type 8-10 motifs
within a rectangular box (CMS Type 11).

Table 28 – Plate 37

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	145-1	100 - str. 4c	EBA	1,1	3,5	1,2	ILS - 12	interwoven geometric designs	one or two strings of cord: Z-twist 3 mm in diameter; folds of a cover (leather?)	bag sealing?	none found
2	153-6	100 - str. 6	EBA	4	3,1	1,5	ILS - 12	elaborate interwoven geometric designs	two strings of same cord: S-twist 6 mm in diameter and half knotted; leather cover; diameter of jar neck ca. 12 cm	jar sealing	none found
3	153-16	100 - str. 6	EBA	4,3	1,6	0,9	ILS - 12	elaborate interwoven geometric designs	two strings of same cord: S-twist 3mm in diameter; folds of a cover	bag sealing?	none found
4	153-20	100 - str. 6	EBA	1,6	3,4	0,5	ILS - 12	elaborate interwoven geometric designs	oval sealing with a smooth reverse; color difference between edge and rest of reverse; imprints of straw	wall sealing?	Susa: Amiet 1972: Pl. 26:1051

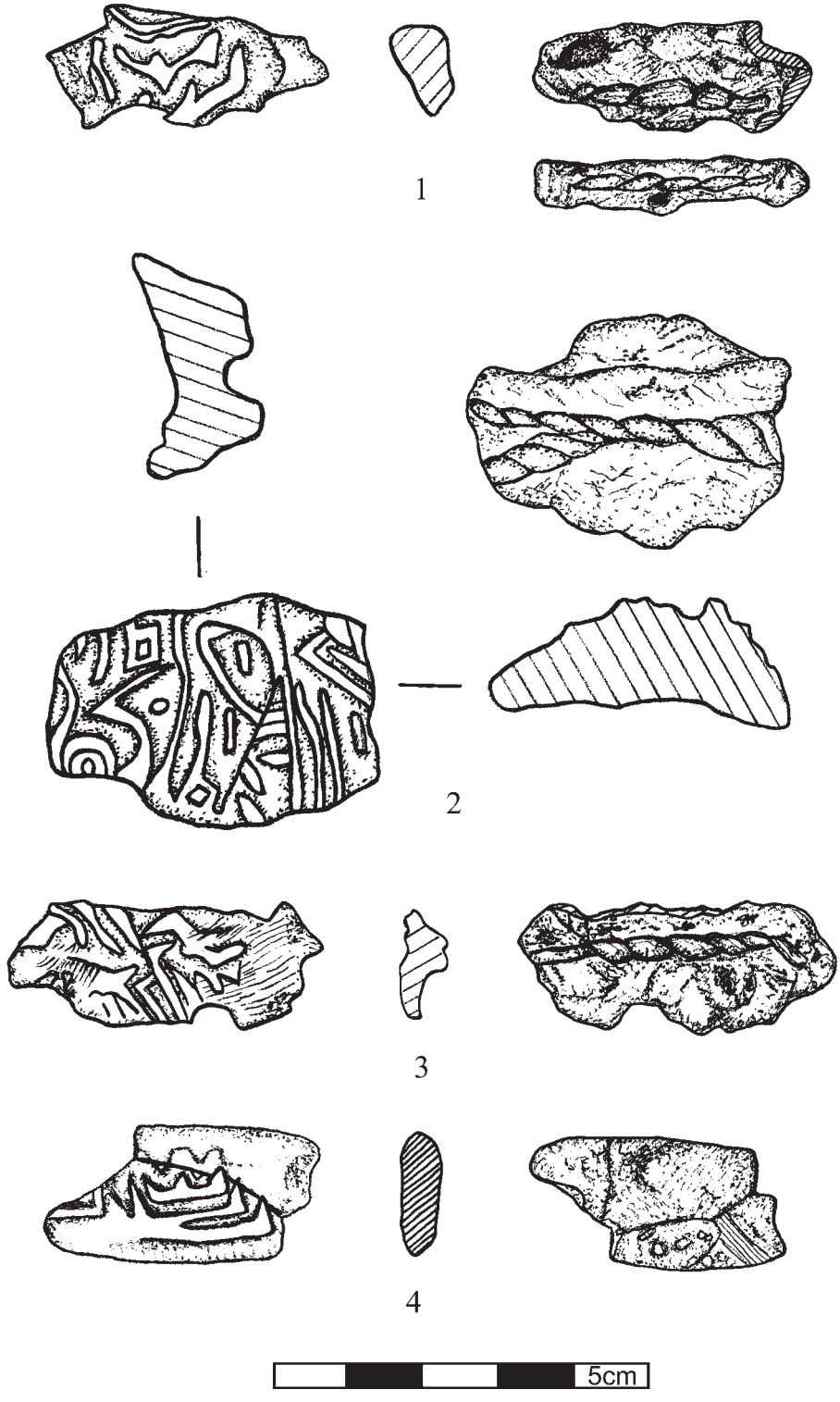

Plate 37 – Reconstructed drawings of clay sealings with cylinder seal impressions with geometric interlocking designs (ILS Type 12).

Table 29 – Plate 38

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	321-4	300 - str. 1f	EBA	2	1,8	0,8	ILS - 13	animal motif and interlocking geometric designs?	hollow negative of an unidentifiable cubic or cylindrical object; a string of cord on the edge: Z-twist 3mm in diameter	indeterminable	Susa: Amiet 1972: Pl. 26:1051
2	313-5	300 - str. 1c	EBA	1,9	1,4	0,5	ILS - 12	elaborate interwoven geometric designs	convex reverse with fingerprint	indeterminable	Susa: Carter 1980: Fig. 17.1
3	153-40	100 - str. 6	EBA	1,4	1,7	0,8	ILS - 12	two interlocking toothed lines	waterworn sealing consisting of two surfaces meeting at a right angle; two strings of the same cord on the reverse	jar sealing	none found
4	153-8	100 - str. 6	EBA	2,4	2,7	0,8	ILS - 13	animal motif and interlocking geometric designs	two strings of same cord: S-twist 3 mm in diameter; textile cover	jar sealing	none
5	318-2	300 - str. 1e	EBA	1,6	2,3	0,6	ILS - 13	interlocking animal motif	a few strings of cord in a raised part in the middle: Z-twist 3 mm in diameter; leather imprints	jar sealing	Susa: Amiet 1972: Pl. 25:1021
6	312-5	300 - str. 1c	EBA	2,1	1,6	0,6	ILS - 12	two interlocking toothed lines	a string of hairy cord on the edge: S-twist 5 mm in diameter; smooth leather cover?	jar sealing?	none found
7	153-12 153-19	100 - str. 6	EBA	4,4	3	0,7	ILS - 13	animal motif and interlocking geometric designs	relatively flat sealing with four strings of the same cord: Z-twist 3 mm in diameter; smooth cover (leather?)	jar sealing?	Susa: Amiet 1972: Pl. 26:1076

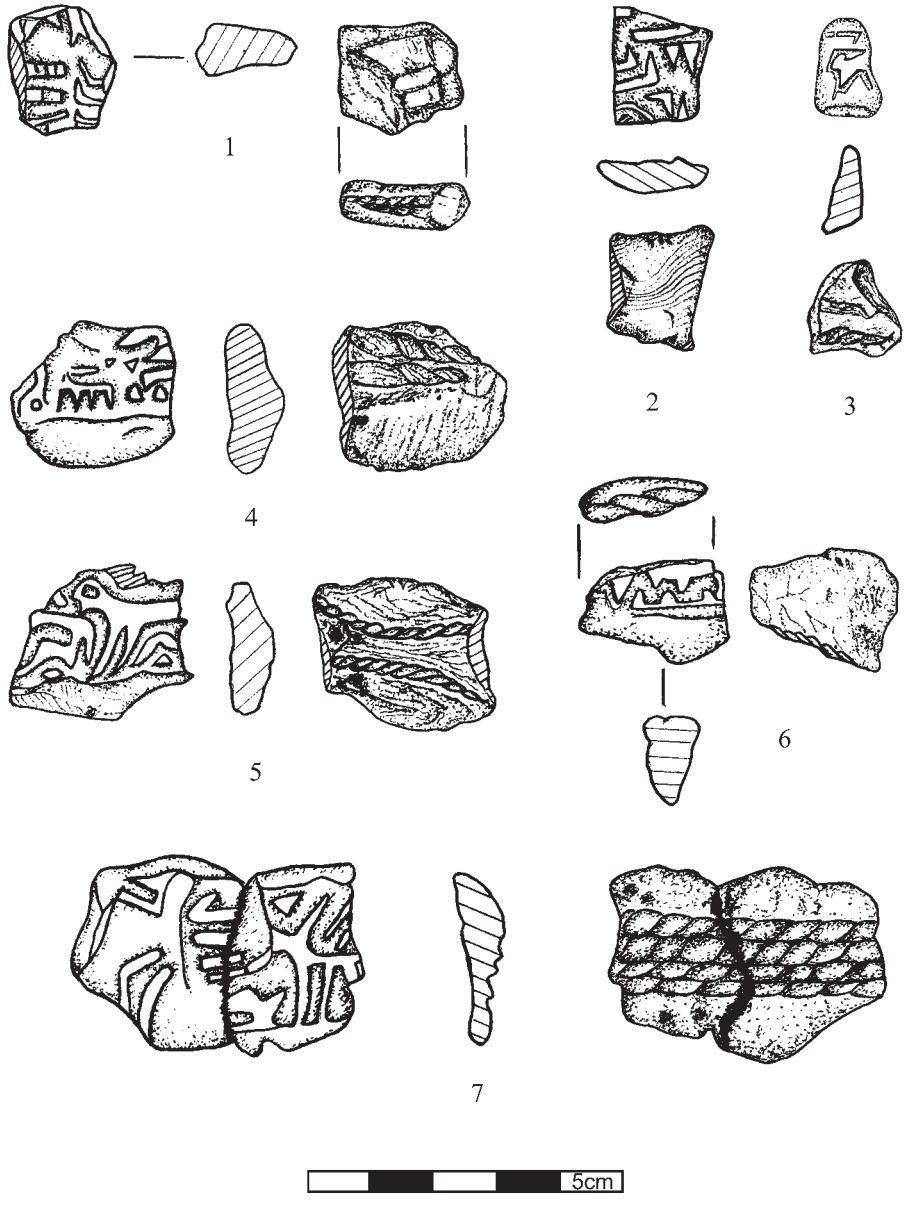

Plate 38 – Reconstructed drawings of clay sealings with cylinder seal impressions with interlocking designs (ILS Type 12-13).

Table 30 – Plate 39

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	111-6	100 - str. 4a	EBA	3,2	2,3	0.8–1	GSS - 14?	poorly preserved; hatched group: simple hatched band (alternatively: LC1-2 stamp seal)	somewhat smooth reverse without any identifiable imprints	receipt	Susa: Delaporte 1920: Pl. 13:6 Tal-i Bakun: Rashad 1990: no. 524
2	115-1	100 - str. 3	Iron Age	1,6	1	0,9	GSS - 14	hatched group: simple hatched band and a border line	a string of hairy cord: Z-twist 3 mm diameter; folds of a cover (leather?)	indeterminable	Susa: Delaporte 1920: Pl. 13:4 Ur: Legrain 1936: no. 138
3	111-5	100 - str. 4a	EBA	4	2,2	0,5	GSS - 14	hatched group: shelf pattern	rectangular sealing with flat, smooth reverse bearing faint imprint of mud plaster	wall sealing	Fara: Martin 1988: no. 92 Susa: Delaporte 1920: Pl. 19:13
4	312-14	300 - str. 1c	EBA	1,7	1,4	0,5	GSS - 14	hatched group: simple hatched band and a border line	irregular surface without any identifiable imprints	indeterminable	Susa: Delaporte 1920: Pl. 13:4 Ur: Legrain 1936: no. 138
5	316-4	300 - str. 1d	EBA	2,3	2,2	0,7	GSS - 14	hatched group: shelf pattern	rectangular sealing with flat, smooth reverse; without clear imprint of mud plaster	indeterminable	Susa: Delaporte 1920: Pl. 19:13
6	341-3	300 - str. 2	EBA?	1,8	1,6	0,8	GSS - 14?	poorly preserved; a pattern of triangles	flat surface; leather cover	indeterminable	Susa: Delaporte 1920: Pl. 15:12
7	153-33	100 - str. 6	EBA	1,7	1,8	0,4	GSS - 14	hatched group: simple hatched band?	flat sealing; irregular reverse with imprint of mud plaster?	wall sealing?	none found
8	312-1	300 - str. 1c	EBA	1,5	1,2	0,6	GSS - 14	hatched group: simple hatched band; textile impression on the edge	smooth surface without any identifiable imprints; textile imprints near and on the edge	indeterminable	Susa: Delaporte 1920: Pl. 16:17 Ur: Legrain 1936: no. 138
9	312-7	300 - str. 1c	EBA	1,3	1,3	0,8	GSS - 15	poorly preserved; multiple elements group	a string of cord on the edge: S-twist 2 mm in diameter	indeterminable	none found
10	341-2	300 - str. 2	EBA?	1,7	1,4	0,5	GSS - 14?	poorly preserved; a pattern of triangles	two strings of hairy cord: 5 mm diameter; folds of a smooth cover?	indeterminable	Susa: Legrain 1921: Pl. 2:21
11	312-6	300 - str. 1c	EBA	2,3	1,5	0,6	GSS - 14	hatched group: irregular hatched bands?	a string of cord on the edge: S-twist 2mm diameter; irregular hollow negatives	indeterminable	Khafajah Sin IV: Frankfort 1955: Pl. 21:217
12	308-8	300 - str. 1b	EBA	2,7	2	1,1	GSS - 15	multiple element group: geometric design including a concentric eye	flat sealing; a string of smooth cord; leather cover	indeterminable	Gubba V: Ii 1988: Fig. 9.44
13	153-21	100 - str. 6	EBA	3	2	0,5	GSS - 14	hatched group: geometric pattern including a hatched circle	irregular surface without any imprints	indeterminable	Tell Aghrab (Shara Temple): Frankfort 1955: Pl. 82:869 Gubba VII: Ii 1988: Fig. 8.37
14	312-12	300 - str. 1c	EBA	1,4	1,3	0,6	GSS - 15	poorly preserved; multiple element group: a rosette within a circle	two strings of hairy cord: 5 mm diameter; imprints of a cover	jar sealing?	Nineveh: Pittman 2019: Pl. 10.9:7 Ur: Legrain 1951: no. 554
15	167-1	100 - str. 8b	EBA	2	2	1,1	GSS - 14	hatched group: geometric pattern in at least two rows, including triangles	somewhat smooth surface with a hollow on one of the sides	indeterminable	Susa: Delaporte 1920: Pl. 15:7

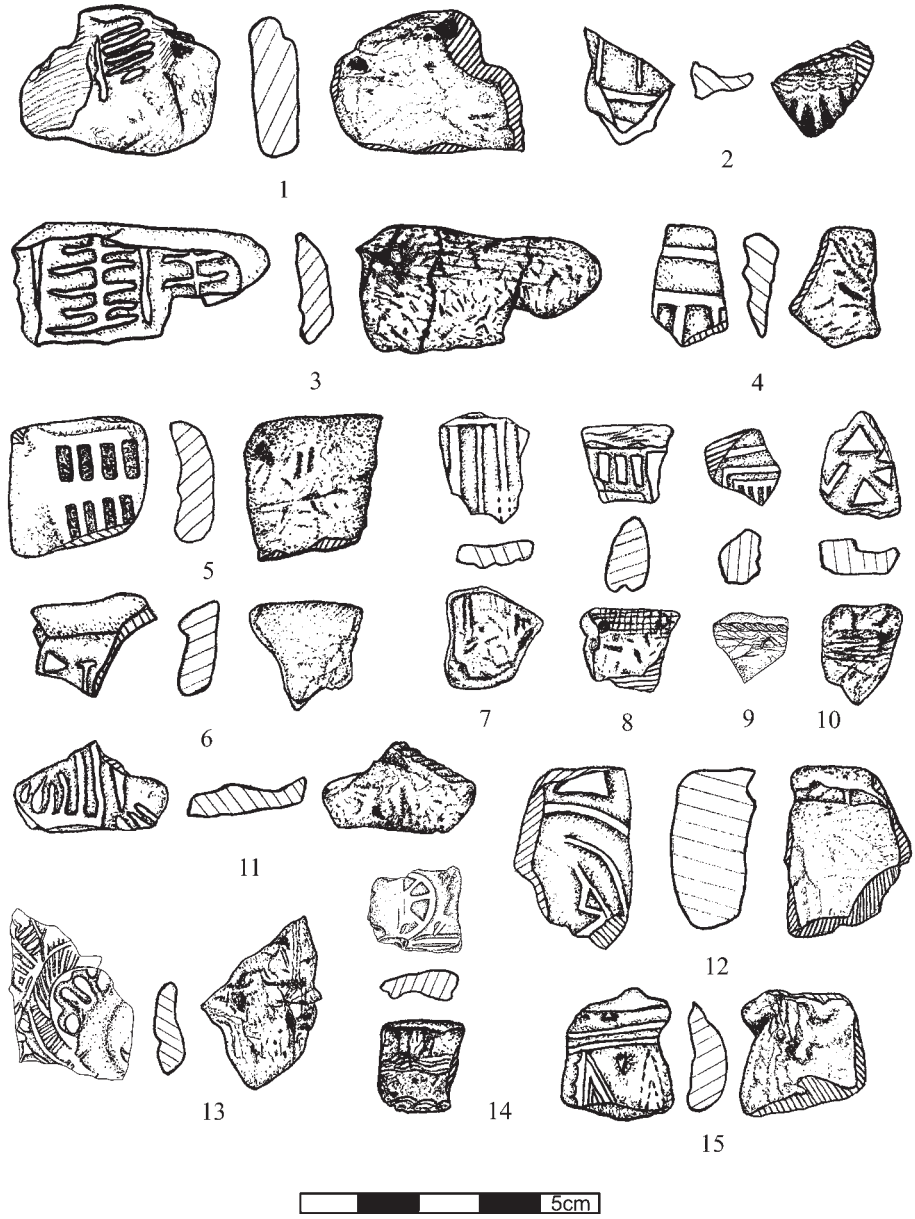

Plate 39 – Reconstructed drawings of clay sealings with cylinder seal impressions with glazed steatite style designs (GSS Type 14-15).

Table 31 – Plate 40

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	126-1	100 - str. 4b	EBA	3	2,7	1,15	GSS - 14	hatched group: three rows of hatched bands within a hatched triangle	rectangular, flat sealing with heavy mud plaster adhered on the back	wall sealing	none found
2	161-1	100 - str. 7		4	1,8	1,9	GSS - 14	hatched group: geometric pattern including hatched ovals	profile of a door peg probably with flaring ends; texture of wood with vertical grooves (lack of cord imprint suggests use of different closing mechanism, e.g. wooden hook (Zettler 1987: Figs. 3-4))	door sealing	none found
3	164-1	100 - str. 8b	EBA	1,9	1,5	0,8	GSS - 14	hatched group: geometric designs	triangular sealing; reverse has two surfaces: one irregular but without clear cord imprint, the other very smooth (exterior surface of a jar)	jar sealing	Susa: Carter 1980: Fig. 17.7
4	153-2 153-29 153-35	100 - str. 6	EBA	6,5	1,8	1	GSS - 15	multiple element group: geometric designs in three rows	two perpendicular smooth surfaces with the imprints of the shoulder and neck of a vessel; no traces of cover or cord, implying the sealing was placed directly on the shoulder and the rim of the vessel (Zettler 1989: 374, Fig. 49), rim diameter ca. 14 cm	jar sealing	Southern Levant: Ben-Tor 1978: Figs. 2.12, 3.20, 4.24, 4.25; Braun 2004: Fig. 6.5
5	111-2	100 - str. 4a	EBA	2,5	2	1	GSS - 15	multiple element group: geometric designs in three rows including herringbone pattern	irregular pitted surface lacking any imprints; impression of a string of cord on the edge?	indeterminable	Southern Levant: Ben-Tor 1978: Fig. 1.8-9 Tell Mohammad Arab: Pittman 2019: Pl. 10.12:6 Ur: Legrain 1936: no. 26
6	129-2	100 - str. 4b	EBA	2,5	1,3	0,5	GSS - 15	multiple element group: geometric design similar to the first row of 111-2	flat sealing with a small piece of plaster adhered on the back	wall sealing?	Tell Mohammad Arab: Pittman 2019: Pl. 10.12:6 Gubba IV-III: Ii 1988: Fig. 12.96-98, Fig. 23 Ur: Legrain 1936: no. 26
7	153-22	100 - str. 6	EBA	3,2	3	0,6	GSS - 15	multiple element group: geometric designs including toothed lines	flat sealing with mud plaster containing straw adhered on the back	wall sealing	none found
8	153-27	100 - str. 6	EBA	1,9	3	0,6	GSS - 15	multiple element group: geometric designs including toothed lines	flat sealing with two strings of cord: Z-twist 3 mm in diameter; folds of a smooth cover (leather?)	jar sealing	none found
9	341-4	300 - str. 2	EBA?	3	3	0,7	GSS - 15	multiple element group: geometric designs including toothed lines	smooth edges and a scratched part in the middle	indeterminable	none found
10	320-2	300 - str. 1f	EBA	2,6	2,5	1,1	GSS - 15	multiple element group: geometric designs including toothed lines	flat surface with plaster tightly adhered on the back	wall sealing	none found

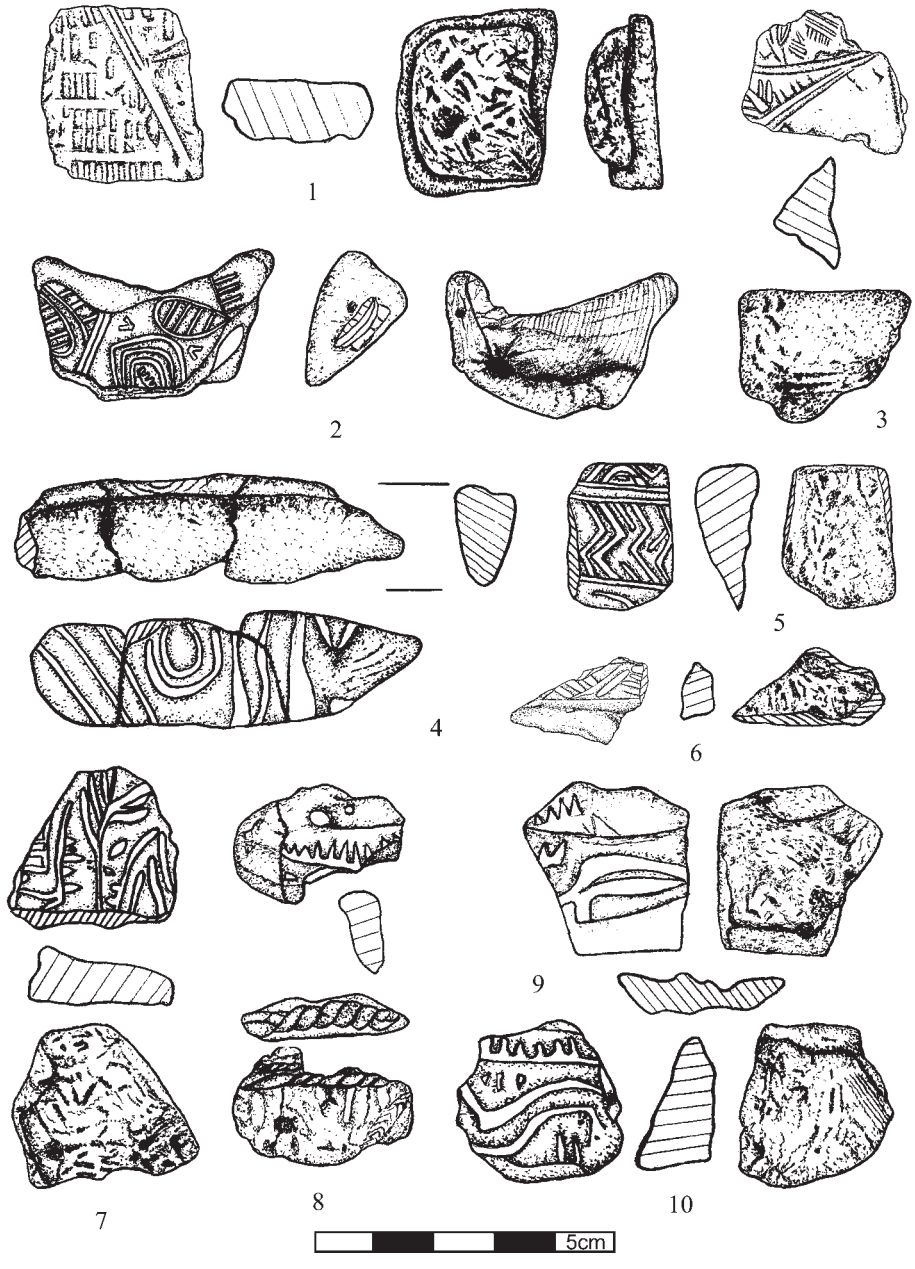

Plate 40 – Reconstructed drawings of clay sealings with cylinder seal impressions with glazed steatite style designs (GSS Type 14-15).

Table 32 – Plate 41

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	304-1	300 - str. 1c	EBA	2,5	2	0,6	MISC - 16	indistinct design: a geometric pattern or a tree or an abstract scorpion?	flat irregular surface (leather cover?)	indeterminable	none found
2	312-10	300 - str. 1c	EBA	2,1	1,8	0,6	MISC - 16	geometric design, chevron pattern	smooth surface without any identifiable imprints	indeterminable	Shamir (Levant): Ben-Tor 1978: Pl. 3:19
3	313-7	300 - str. 1c	EBA	1,3	1,8	0,6	MISC - 16	geometric design, net pattern	irregular surface imprints of animal hair	indeterminable	Susa: Delaporte 1920: Pl. 13:20 Southern Levant: Ben-Tor 1978: Pl. 1:5-6
4	111- 4	100 - str. 4a	EBA	1,6	1,3	0,6		illegible	flat surface with a string of cord on the corner: Z-twist 3 mm in diameter	indeterminable	none found
5	151-1	100 - str. 5	EBA	1,7	1,6	0,7		illegible	flat surface with mud plaster adhered on the back	wall sealing	none found

Plate 41 – Reconstructed drawings of clay sealings
with cylinder seal impressions with miscellaneous designs (1-3; MISC Type 16)
and clay sealings with illegible seal impressions (4-5).

Table 33 – Plate 42

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-47	100 - str. 6	EBA	3,2	2,9	0,8		waterworn, illegible	two strings of cord: Z-twist 3 mm in diameter; grooves and hollows on the edge (lower part of a jar rim?)	jar sealing	none found
2	312-4	300 - str. 1c	EBA	1,8	1,6	0,6		illegible, textile impression on the edge	irregular surface without any identifiable imprints	indeterminable	none found
3	302-5	300 - str. 1a	EBA	2	1,9	0,7		illegible	flat and smooth without any identifiable imprints	indeterminable	none found
4	316-1	300 - str. 1d	EBA	1,6	2,2	0,6		a triangle between two lines, illegible	irregular flat surface without any identifiable imprints	indeterminable	none found
5	318-7	300 - str. 1e	EBA	2,5	2	0,8		illegible	two hollow negatives above and below a raised part in the middle: a string of cord? leather cover?	indeterminable	none found
6	312-11	300 - str. 1c	EBA	2	1,5	0,6		illegible	two strings of cord: S-twist 3 mm in diameter; cord on the edge and a cover	jar sealing	none found
7	313-11	300 - str. 1c	EBA	1,5	1,3	0,75		illegible	irregular surface with imprint of a leather cover (?)	indeterminable	none found
8	318-9	300 - str. 1e	EBA	2,1	2,2	1,1		illegible	five strings of overlapping, interwoven smooth branches (wickerwork)	basket with lid	none found
9	318-10	300 - str. 1e	EBA	1,8	2	0,8		illegible	irregular flat surface without any identifiable imprints	indeterminable	none found
10	320-3	300 - str. 1f	EBA	2,5	1	0,5		illegible	a string of cord: Z-twist 3 mm in diameter; leather cover; negative of a rounded object ca. 12.2 cm in diameter	jar sealing	none found
11	321-5	300 - str. 1f	EBA	2,5	1	1		illegible	irregular surface with a cord strand on the edge?	indeterminable	Susa: Amiet 1972: Pl. 26:1051?
12	330-1	300 - str. 1d	EBA	2,4	1,2	0,6		illegible	mud plaster containing heavy straw adhered on the back	wall sealing?	none found
13	320-5	300 - str. 1f	EBA	1	0,9	0,35		illegible	irregular surface with a hollow and a string of cord on the edge	indeterminable	none found
14	320-6	300 - str. 1f	EBA	1,3	1	0,25		illegible, a smooth hollow on the edge	smooth surface with a smooth cord 2 mm in diameter	indeterminable	none found
15	321-3	300 - str. 1f	EBA	1,5	1,8	0,4		a toothed line? illegible	irregular surface without any identifiable imprints	indeterminable	none found

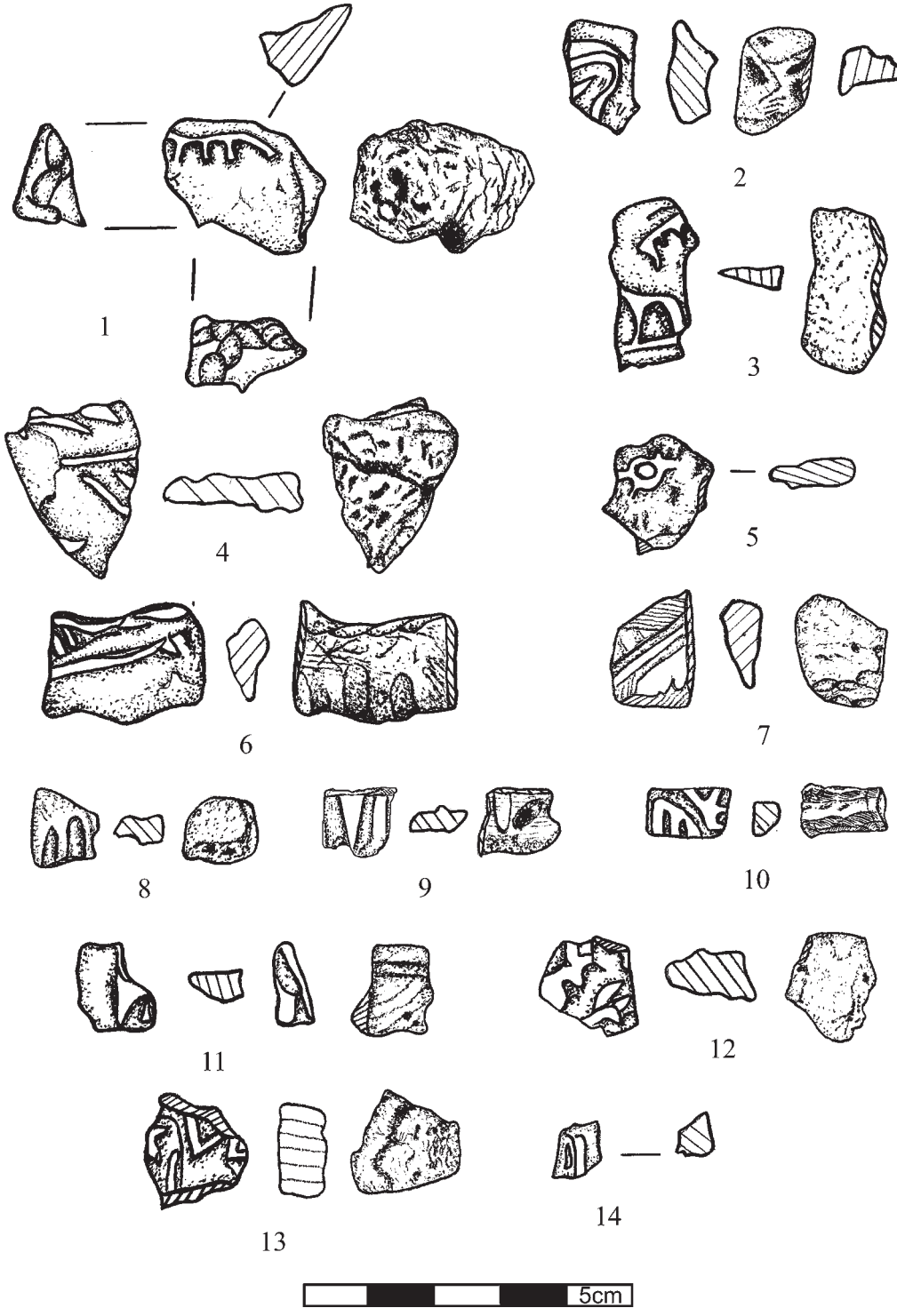

Plate 42 – Reconstructed drawings of clay sealings with illegible seal impressions.

Table 34 – Plate 43

	findspot			dimensions			seal motif		reverse description	function	parallels
	context	stratum	period	length	width	thick	type	description			
1	153-47	100 - str. 6	EBA	3,2	2,9	0,8		waterworn, illegible	two strings of cord: Z-twist 3 mm in diameter; grooves and hollows on the edge (lower part of a jar rim?)	jar sealing	none found
2	312-4	300 - str. 1c	EBA	1,8	1,6	0,6		illegible, textile impression on the edge	irregular surface without any identifiable imprints	indeterminable	none found
3	302-5	300 - str. 1a	EBA	2	1,9	0,7		illegible	flat and smooth without any identifiable imprints	indeterminable	none found
4	316-1	300 - str. 1d	EBA	1,6	2,2	0,6		a triangle between two lines, illegible	irregular flat surface without any identifiable imprints	indeterminable	none found
5	318-7	300 - str. 1e	EBA	2,5	2	0,8		illegible	two hollow negatives above and below a raised part in the middle: a string of cord? leather cover?	indeterminable	none found
6	312-11	300 - str. 1c	EBA	2	1,5	0,6		illegible	two strings of cord: S-twist 3 mm in diameter; cord on the edge and a cover	jar sealing	none found
7	313-11	300 - str. 1c	EBA	1,5	1,3	0,75		illegible	irregular surface with imprint of a leather cover (?)	indeterminable	none found
8	318-9	300 - str. 1e	EBA	2,1	2,2	1,1		illegible	five strings of overlapping, interwoven smooth branches (wickerwork)	basket with lid	none found
9	318-10	300 - str. 1e	EBA	1,8	2	0,8		illegible	irregular flat surface without any identifiable imprints	indeterminable	none found
10	320-3	300 - str. 1f	EBA	2,5	1	0,5		illegible	a string of cord: Z-twist 3 mm in diameter; leather cover; negative of a rounded object ca. 12.2 cm in diameter	jar sealing	none found
11	321-5	300 - str. 1f	EBA	2,5	1	1		illegible	irregular surface with a cord strand on the edge?	indeterminable	Susa: Amiet 1972: Pl. 26:1051?
12	330-1	300 - str. 1d	EBA	2,4	1,2	0,6		illegible	mud plaster containing heavy straw adhered on the back	wall sealing?	none found
13	320-5	300 - str. 1f	EBA	1	0,9	0,35		illegible	irregular surface with a hollow and a string of cord on the edge	indeterminable	none found
14	320-6	300 - str. 1f	EBA	1,3	1	0,25		illegible, a smooth hollow on the edge	smooth surface with a smooth cord 2 mm in diameter	indeterminable	none found
15	321-3	300 - str. 1f	EBA	1,5	1,8	0,4		a toothed line? illegible	irregular surface without any identifiable imprints	indeterminable	none found

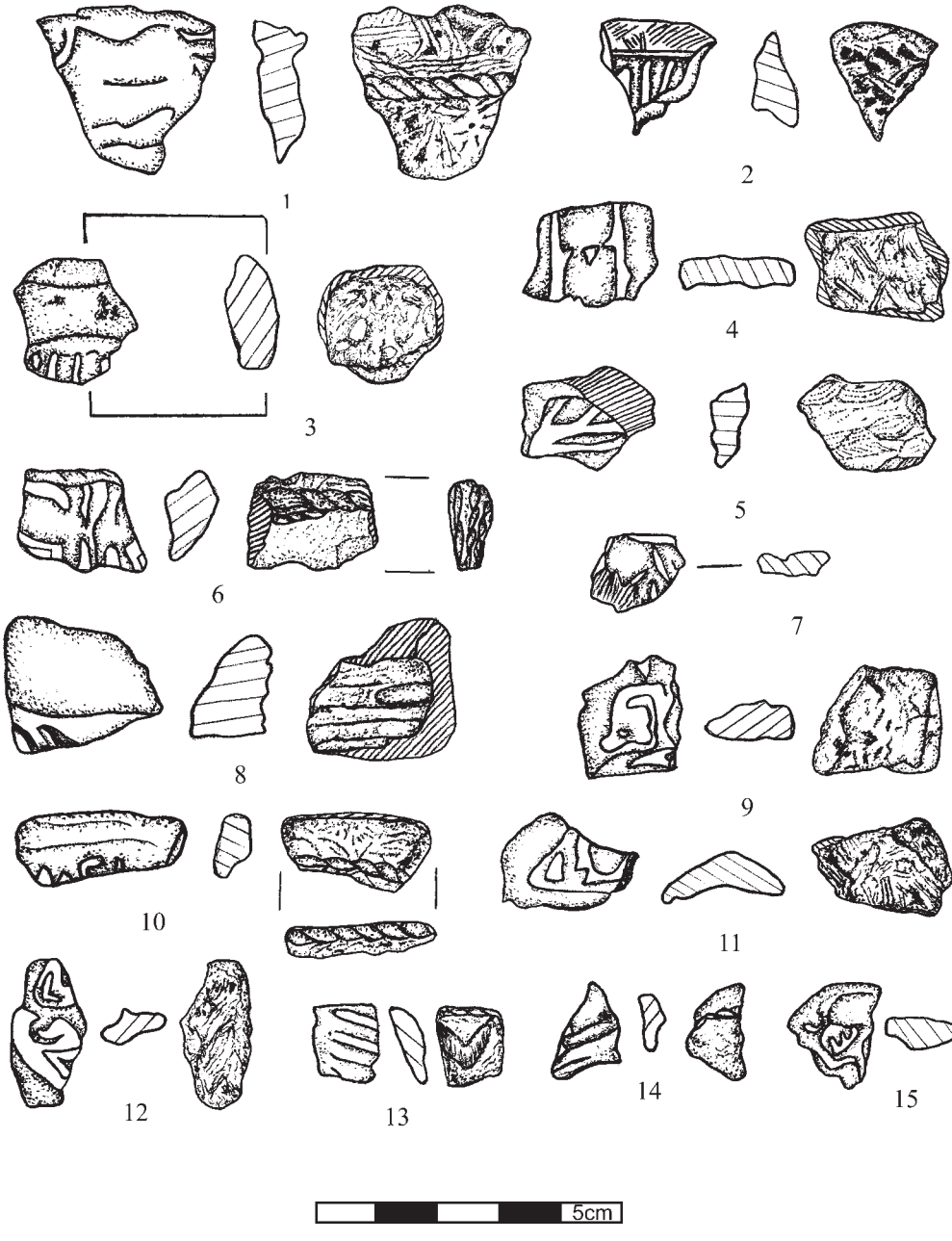

Plate 43 – Reconstructed drawings of clay sealings with illegible seal impressions.

Table 35 – Plate 44

	drawing	findspot			dimensions			seal impression		function
		context	stratum	period	length	width	thick	seal	type	
1	Pl. 28:1	358-1	300 - str. 4	EC	4	3,1	0.4–1.2	stamp	type 1	door sealing
2	Pl. 33:4	313-4	300 - str. 1c	EBA	2,7	2,8	0,4	cylinder	CMS - 7	indeterminable
3	Pl. 28:3	153-17	100 - str. 6	EBA	3,4	1,1	0,9	stamp	type 2	jar sealing
4	Pl. 27:3	337-1	300 - str. 2	LC1-2	3,7	2,3	0,7	stamp	type 1	wall sealing?
5	Pl. 27:1	116-2	100 - str. 3	?	1,4	1,9	0,4	stamp	type 1	wall sealing?

Plate 44 – Photographs of clay sealings with multiple stamp or cylinder seal impressions.

Table 36 – Plate 45

	drawing	findspot			dimensions			seal impression		function
		context	stratum	period	length	width	thick	seal	type	
1	Pl. 33:1	153-25	100 - str. 6	EBA	3,2	2,6	0,7	cylinder	CMS - 5	jar sealing
2	Pl. 29:7	153-45	100 - str. 6	EBA	2,8	1,6	0,6	cylinder	CMS - 1	jar sealing
3	Pl. 34:6	318-5	300 - str. 1e	EBA	2	2	0.4–1	cylinder	CMS - 9	jar sealing
4	Pl. 30:3	153-13	100 - str. 6	EBA	3,2	2,8	0,6	cylinder	CMS - 2	jar sealing
5	Pl. 40:3	164-1	100 - str. 8b	EBA	1,9	1,5	0,8	cylinder	GSS - 14	jar sealing
6	Pl. 33:8	318-3	300 - str. 1e	EBA	1,5	2,1	0,4	cylinder	CMS - 8	jar sealing
7	Pl. 40:4	153-2	100 - str. 6	EBA	6,5	1,8	1	cylinder	GSS - 15	jar sealing
8	Pl. 29:2	153-23	100 - str. 6	EBA	2	0,7	0,4	cylinder	CMS - 1	box sealing?

Plate 45 – Photographs of container sealings
(1-7: jar sealings; 8: box sealing).

Table 37 – Plate 46

	drawing	findspot			dimensions			seal impression		function
		context	stratum	period	length	width	thick	seal	type	
1	Pl. 43:8	318-9	300 - str. 1e	EBA	2,1	2,2	1,1	cylinder	illegible	basket with lid
2	Pl. 31:7	331-1	300 - str. 1d	EBA	3	2,6	0,7	cylinder	CMS - 2	basket sealing?
3	Pl. 28:2	333-1	300 - str. 1f	EBA	4,8	4,2	1,2	stamp	type 3	bag sealing
4	Pl. 37:3	153-16	100 - str. 6	EBA	4,3	1,6	0,9	cylinder	ILS - 12	bag sealing?
5	Pl. 39:1	111-6	100 - str. 4a	EBA	3,2	2,3	0.8–1	cylinder	GSS - 14?	receipt
6	Pl. 27:5	160-1	100 - str. 7	?	3,2	2,4	0,7	stamp	type 1	receipt
7	Pl. 27:6	358-2	300 - str. 4	EC	4	2,6	0,9	stamp	type 1	receipt
8	Pl. 27:7	361-1	300 - str. 5	EC	5	4	1,5	stamp	type 1	receipt

Plate 46 – Photographs of container sealings
(1-2: wicker imprints from baskets or lids; 3-4: bag sealings),
and receipt sealings (5-8).

Table 38 – Plate 47

	drawing	findspot			dimensions			seal impression		function
		context	stratum	period	length	width	thick	seal	type	
1	Pl. 35:1	153-28	100 - str. 6	EBA	3,3	2	1	cylinder	CMS - 9	door sealing
2	Pl. 40:2	161-1	100 - str. 7		4	1,8	1,9	cylinder	GSS - 14	door sealing
3	Pl. 36:1	111-3	100 - str. 4a	EBA	3,7	3	0.5–1.7	cylinder	CMS - 11	wall sealing
4	Pl. 40:1	126-1	100 - str. 4b	EBA	3	2,7	1,15	cylinder	GSS - 14	wall sealing
5	Pl. 30:5	153-24	100 - str. 6	EBA	4,5	2,6	0,6	cylinder	CMS - 4	wall sealing
6	Pl. 32:4	316-2	300 - str. 1d	EBA	2,5	3,5	0,9	cylinder	CMS - 3	wall sealing

Plate 47 – Photographs of immobile entrance sealings
(1-2: door sealings; 3-6: wall sealings).

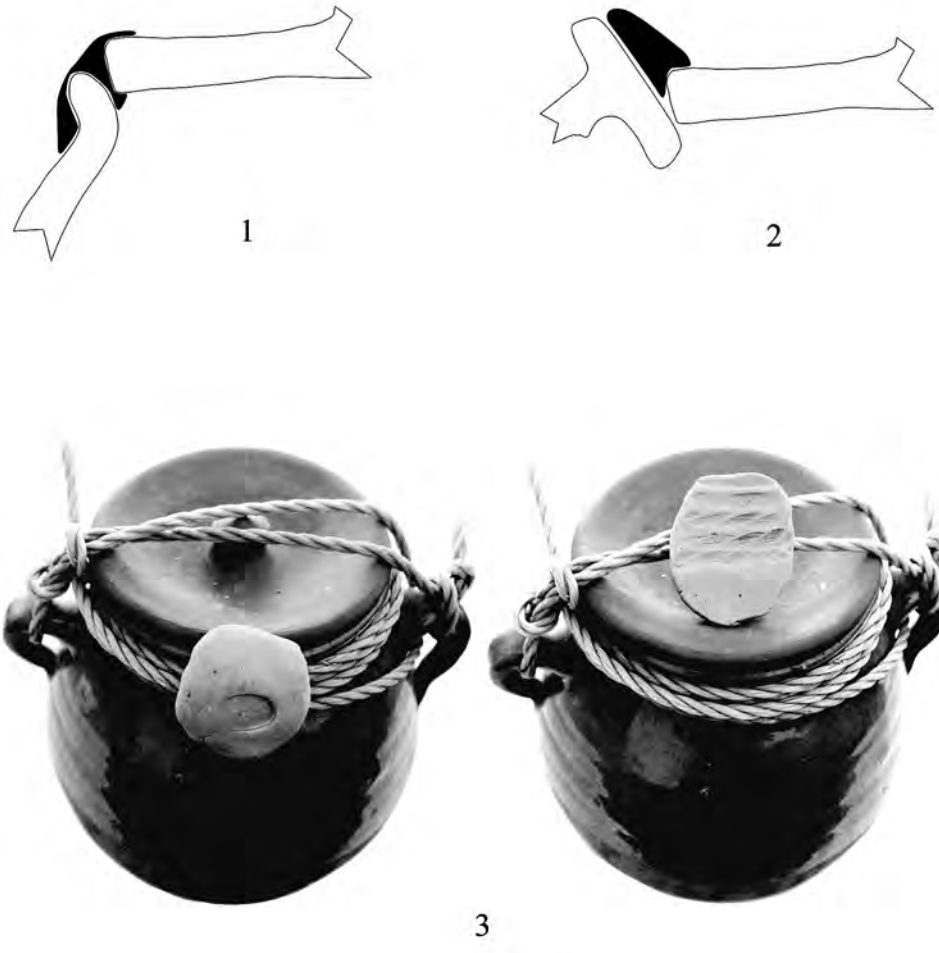

Plate 48 – Potential reconstruction drawings
of different types of jar sealings from Chogha Maran.

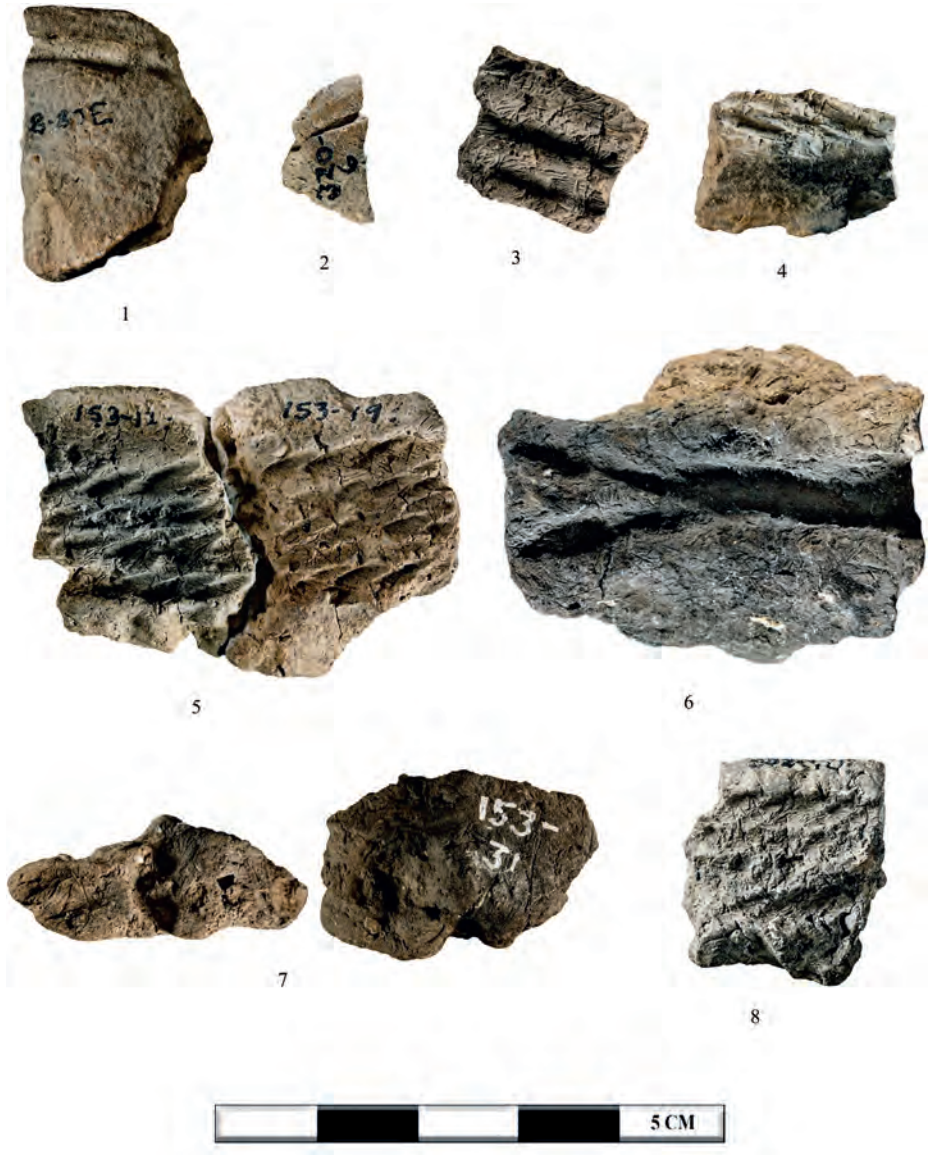

Plate 49 – Photographs of clay sealings with imprints of various types of cords used to bind containers and door pegs: **1**: 308-8 (Pl. 39:12); **2**: 320-6 (Pl. 43:14); **3**: 153-26 (Pl. 29:4); **4**: 312-11 (Pl. 43:6); **5**: 153-12 and 153-19 (Pl. 38:7); **6**: 153-6 (Pl. 37:2); **7**: 153-31 (Pl. 42:1); **8**: 308-10 (Pl. 31:6).

Plate 50 – Photographs of clay sealings with imprints
of various types of covers used to close containers.
1: 153-8 (Pl. 38:4); **2**: 312-1 (Pl. 39:8); **3**: 312-4 (Pl. 43:2);
4: 153-27 (Pl. 40:8); **5**: 313-3 (Pl. 31:9); **6**: 318-3 (Pl. 33:8);
7: 312-2 (Pl. 36:3); **8**: 318-2 (Pl. 38:5); **9**: 308-6 (Pl. 33:2);
10: 313-2 (Pl. 35:3); **11**: 312-5 (Pl. 38:6); **12**: 333-1 (Pl. 28:2).


1
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12
5 CM

Table 39 – Plate 51

	findspot			type	material	dimensions				description
	context	stratum	period			length	width	thick	weight	
1	149	100 - str. 4c	EBA	token	?	4,3	2,4	2,4		biconoid
2	153	100 - str. 6	EBA	token	baked clay	4	2,6	2,4		teardrop
3	361	300 - str. 5	EC	token	?	3,5	2	1,8		biconoid
4	153	100 - str. 6	EBA	token	baked clay	4	2,4	2,8		oval
5	341	300 - str. 2	EBA?	token	?	3,3	2,1	2,1		oval
6	341	300 - str. 2	EBA?	token	clay	2,2	1,2	1,3		cone
7	317	300 - str. 1a	EBA	token	clay	2,2	2	1,5		cone
8	354	300 - str. 3a	LC1-2	tokens	clay	1,9	1,9	-		sphere
						1,9	1,8	-		sphere
						1,5	1,4	-		sphere
						1,4	1,3	-		sphere
						1,2	1,2	-		sphere
						0,8	1	-		sphere
						0,8	0,8	-		sphere
9	153	100 - str. 6	EBA	token	stone	4,7	4,2	-		sphere - granite?
10	199	100 - str. 11	LC1-2	token	stone	1,5	1,7	-		sphere
11	121	100 - str. 4	EBA	token	bone?	1,6	1,8	1,8		flat circle

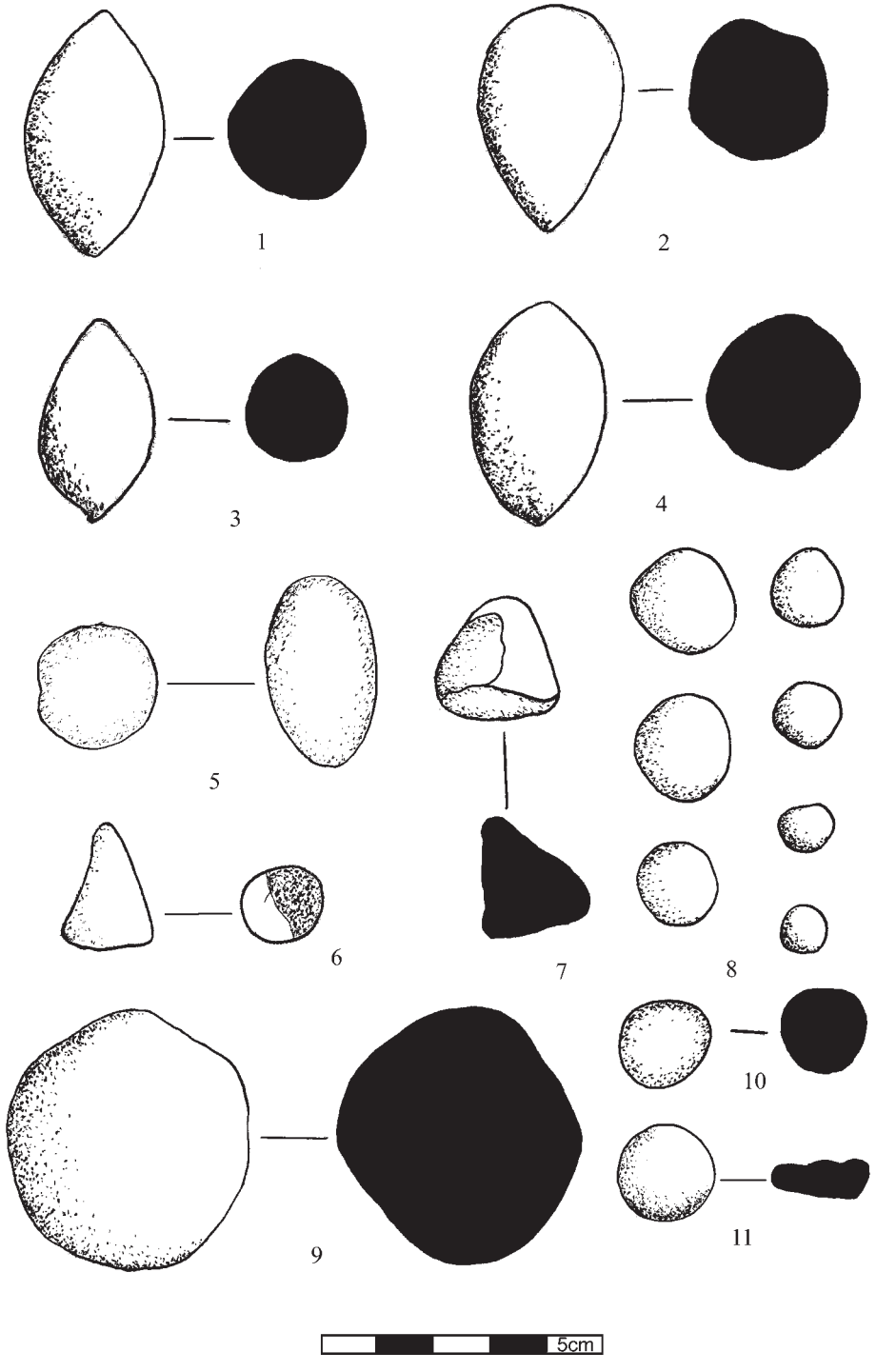

Plate 51 – Drawings of simple tokens.

Table 40 – Plate 52

	findspot			type	material	dimensions				description
	context	stratum	period			length	width	thick	weight	
1	153	100 - str. 6	EBA	token	baked clay	2,9	1,2	1,6		tusk-shaped, broken at one end
2	308	300 - str. 1b	EBA	token	baked clay	5	1,3	1,7		part of tusk or ring
3	308	300 - str. 1b	EBA	token	baked clay	2,8	1,2	1,6		part of tusk or ring
4	313	300 - str. 1c	EBA	token	baked clay	2,8	1	1,6		part of tusk or ring
5	308	300 - str. 1b	EBA	token	clay	1,7	1,7	2		small disk
6	312	300 - str. 1c	EBA	token	clay	1,7	1,8	1,9		small disk
7	164	100 - str. 8b	EBA	token	clay	2,9	2,6	0,4		small disk
8	303	300 - str. 1a	EBA	token	clay	2,9	2,8	2,1		disk - flattened sphere
9	153	100 - str. 6	EBA	token	clay	6,5	4	1,2		flat, oval slab
10	318	300 - str. 1e	EBA	token	baked clay	2,9	2,3	0,4		shell-shaped fragment with incised lines
11	337	300 - str. 2	EBA?	token	pottery	4,5	5,1	0,8		perforated disk

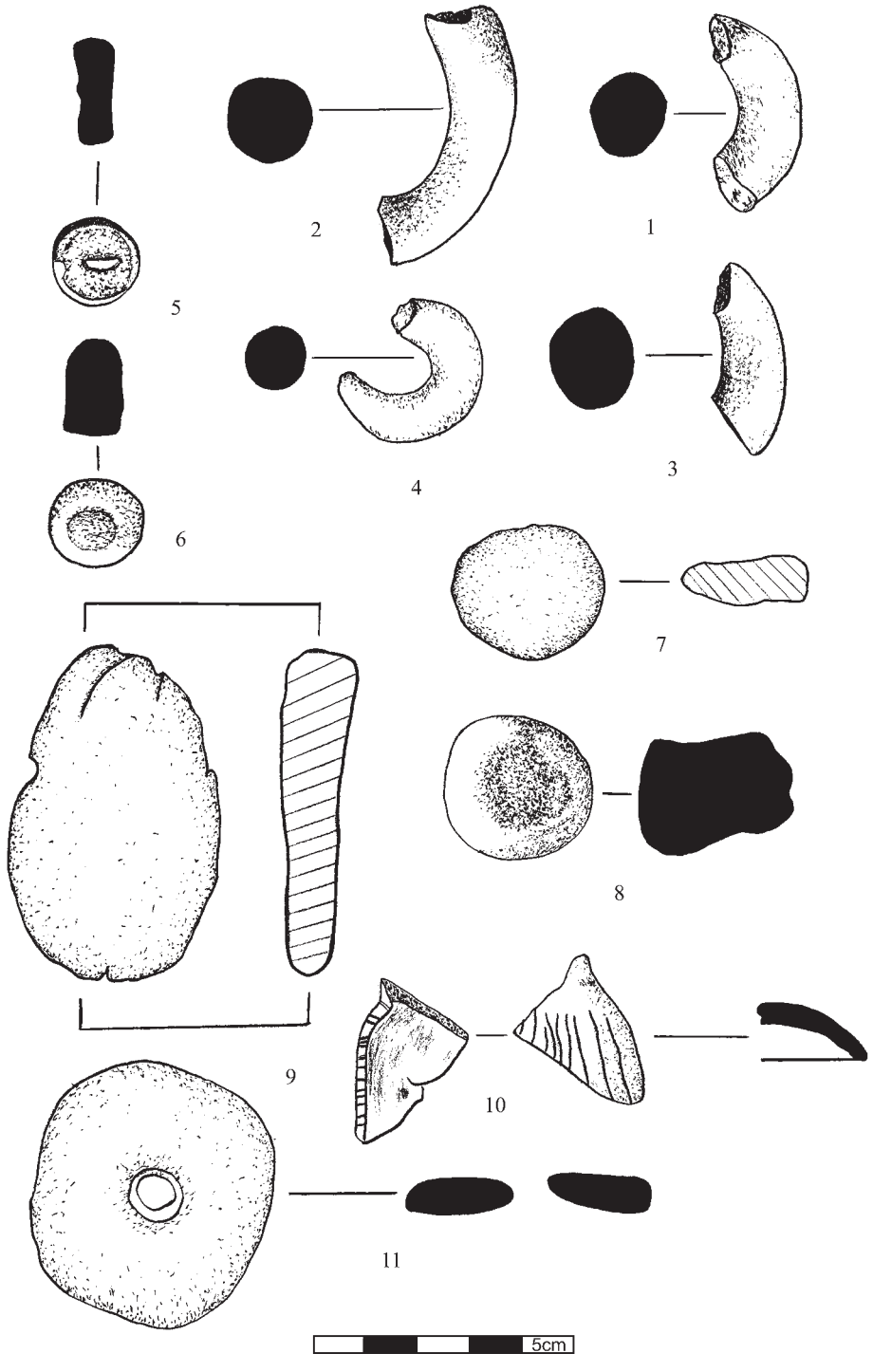

Plate 52 – Drawings of simple and complex tokens.

Table 41 – Plate 53

	findspot			type	material	dimensions				description
	context	stratum	period			length	width	thick	weight	
1	153	100 - str. 6	EBA	figurine	baked clay	2	1	1		part of animal figurine
2	131	100 - str. 4c	EBA	figurine	baked clay	2,3	2,7	?		head of a horned sheep/goat
3		surface		figurine	baked clay	5	2,3	2,3		head of a horned sheep/goat
4	153	100 - str. 6	EBA	figurine	baked clay	1,8	1,6	1		sheep (lamb?) figurine
5	143	100 - str. 6	EBA	figurine	baked clay	2,3	1,2	1,2		animal figurine, head broken off
6	143	100 - str. 4c	EBA	figurine	baked clay	2,2	1,2	1,2		part of animal figurine
7	316	300 - str. 1d	EBA	figurine	baked clay	4,2	1,8	1,7		horned quadruped figurine - back part broken off
8	153	100 - str. 6	EBA	figurine	baked clay	2,3	1,9	1,2		part of animal figurine
9	157	100 - str. 7		figurine	baked clay	1	1,7	?		part of animal figurine
10	308	300 - str. 1b	EBA	figurine	baked clay	1,6	3,7	?		part of animal figurine
11	308	300 - str. 1b	EBA	figurine	baked clay	1,5	2,1	16		hind part of animal figurine

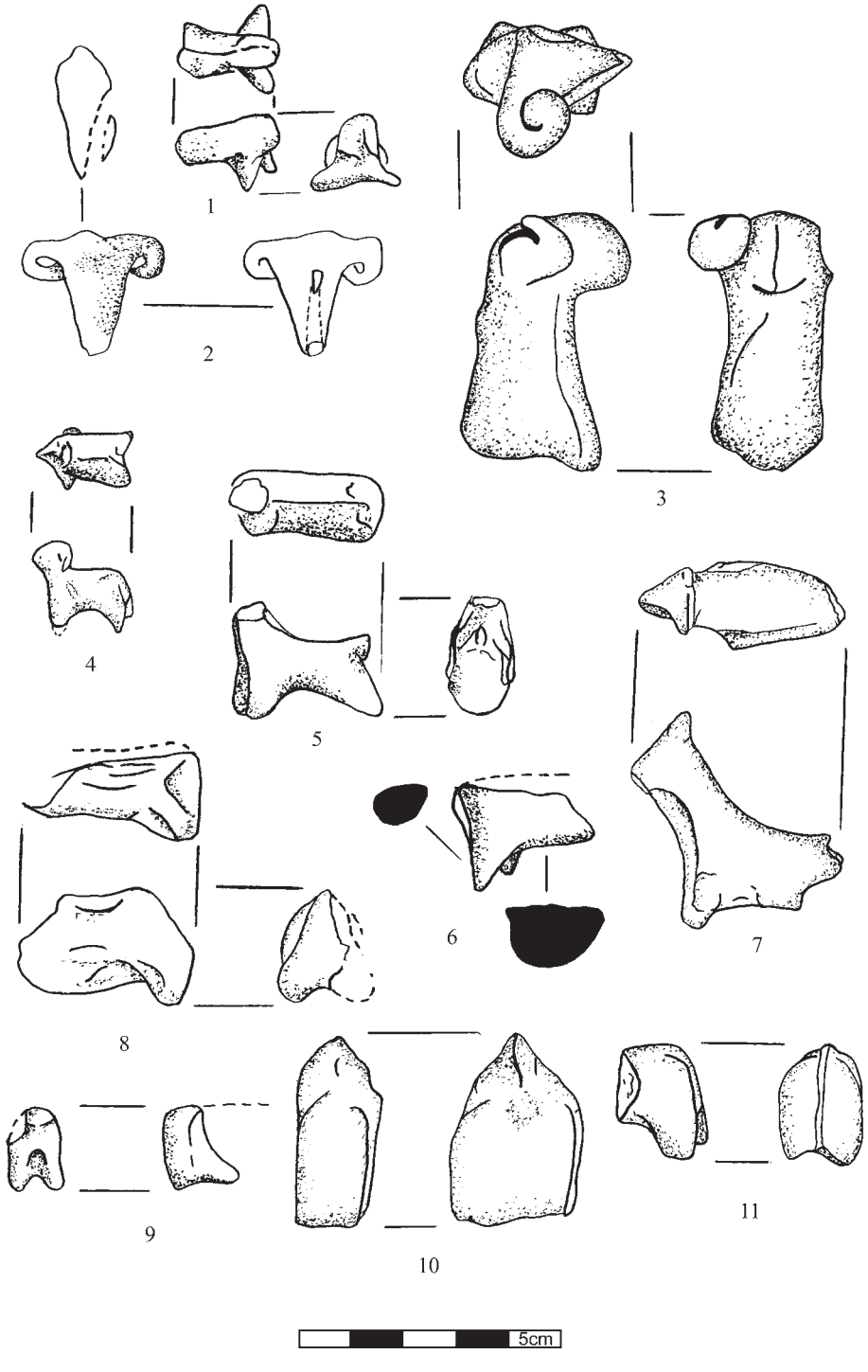

Plate 53 – Drawings of small animal figurines.

Table 42 – Plate 54

	findspot			type	material	dimensions				description
	context	stratum	period			length	width	thick	weight	
1	154	100 - str. 6	EBA	token	baked clay	3	3	1	6,91	disk - tan brown; coarse surface; incised marks
2	129	100 - str. 4b	EBA	token	clay	2,6	2,5	0,5	2,91	disk - tan brown/grey; coarse surface; incised marks
3	141	100 - str. 4c	EBA	token	baked clay	4	2	1,3	8,8	biconoid - dark brown, smooth surface, oval hollow on obverse
4	141	100 - str. 4c	EBA	token	baked clay	4	2,2	0,5	8,27	biconoid - brown, smooth surface, oval hollow on obverse
5	327	300 - str. 1f	EBA	token	baked clay	3,3	1,6	0,5	9,42	biconoid - cream, smooth surface, applied band with ladder pattern and elongated oval hollow
6	313	300 - str. 1c	EBA	token	baked clay	2,7	1,5	0,9	3,49	biconoid - brown, smooth surface
7	313	300 - str. 1c	EBA	token	clay	2,5	1,8	1,4	5,27	somewhat conical - brown, coarse surface
8	332	300 - str. 2	EBA?	token	baked clay	2,3	2,1	1,3	3,32	triangle - dark brown, fine clay, smooth surface
9	316	300 - str. 1d	EBA	token	clay	2,5	1,1	0.5-1.2	3,89	cylinder with convex side - brown, coarse surface
10	316	300 - str. 1d	EBA	token	baked clay	2,3	1	0,9	2,06	cone - dark brown, smooth surface
11	199	100 - str. 11	LC1-2	token	clay	6,7	4,5	0,7	32,34	flat, oval slab - cream, smooth surface

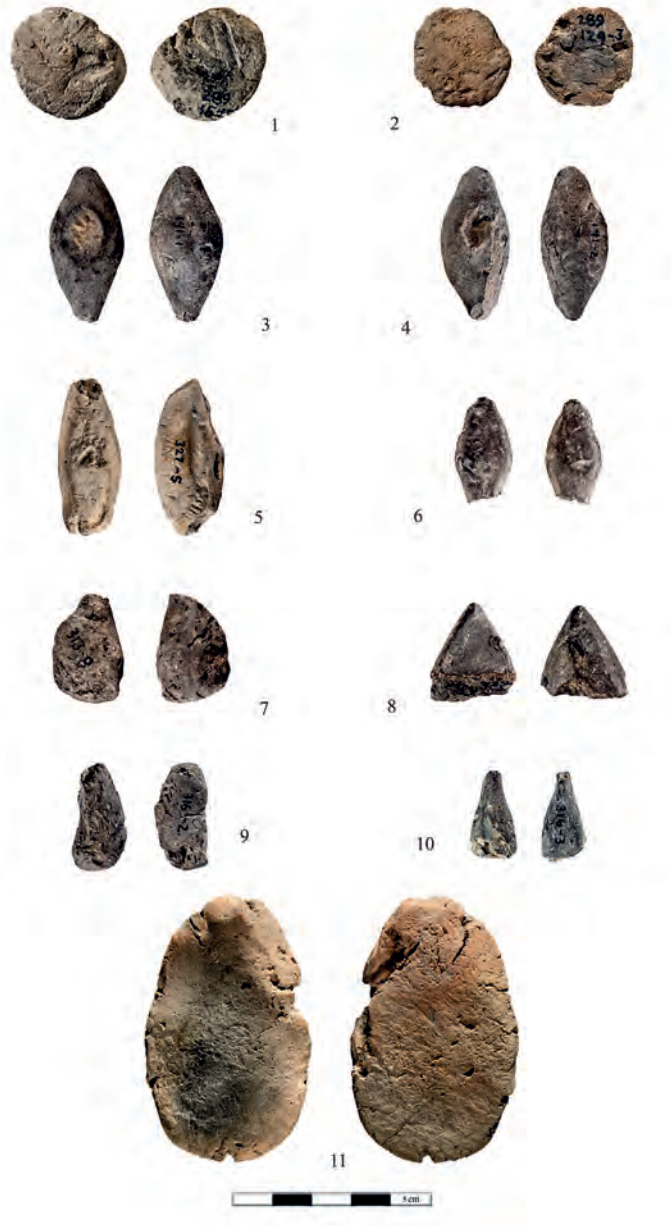

Plate 54 – Photographs of tokens stored at the National Museum of Iran, which lack drawings in the original records.

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CORRELATION OF SEALINGS AND CONTENT ON PROTO-ELAMITE TABLETS: FOUR UNPUBLISHED SEALINGS IN THE NATIONAL MUSEUM OF IRAN

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Abstract: At the end of 4th millennium BCE, small clay tablets include economic records used for some centuries and played a significant role in administrative control. Sometimes these tablets also bear impressions of seals which comprise the most extensive dataset of imagery from this period. The importance of sealing is clear from its function and pictorial information, but on the economic tablets it has new significance allowing us to identify possible specific specializations and the responsible institutions for the economic document. In this study I focus on four unpublished sealings on four different Proto-Elamite clay tablets which are kept in the National Museum of Iran. At first, a description will be presented for each sample, which in turn will be used to group them according to both the content of the image and the text. Finally, I will use this sorting to propose a possible relation between each specialized administration unit and some scenes which they used for their seals.

Keywords: Proto-Elamite; Sealing; Clay tablet; Writing; Glyptic art; Economics

Introduction

The Proto-Elamite horizon (Abdi 2003: 140), characterized by archaeological evidence such as inscribed clay tablets and seal impressions, was initially identified at Susa which is the primary site from the early 3rd millennium BCE in southwestern Iran associated with this period. In the Mesopotamian chronological sequence, this horizon is contemporary with the Jamdat Nasr or Uruk III as well as the Early Dynastic I period (Dittmann 1986). It is well known that the early excavations at Susa were not controlled enough to give a clear succession of strata, but today, by comparing the Proto-Elamite tablets and sealings found during the carefully stratified excavations of Le Brun on the Acropole to the poorly stratified examples

from the early excavations, progress can be made toward better understanding their chronological development and functional use. Following years of scholarly activity and collaboration on this period, it is now possible to date the Proto-Elamite period to 3300 to 2800 BCE (Dahl et al. 2013: 360-361). The most important material from this horizon are the clay tablets with Proto-Elamite (hereafter *PE*) inscriptions. A typological chronology of the tablets proposed by Jacob Dahl, has suggested that it is possible to detect an evolution of the script through several generations of scribes (Dahl 2013). Dahl did not, however, integrate the evidence from the seals found on some of the tablets. These seals add to their value as the evidence of Proto-Elamite culture, and administrative practices.

The *PE* tablets and some of their seal impressions were published in MDP 6, 12, 16, 17, 26, 31, 43, and RA 51. Unfortunately, many of the seal impressions carried on the tablets were neglected and only the inscriptions were copied and published. Pierre Amiet classified the glyptic art and divided the different styles into two broad categories of ancient and classic (Amiet 1972). It is clear that this broad categorizing does not render the complexity of the various styles of this period accurately. Pittman extended the categorizing into four groups: classic, glazed steatite/piedmont, incised, and wheel cut (Pittman 1994). She argued that the classic group style is consistently used together with the Proto-Elamite script (Pittman 2006-2008). She did not, however, propose an evolution within the classic Proto-Elamite style.

Since the decipherment of *PE* texts is not yet completed, in current research, the results of Jacob Dahl's research and his method for describing the text content were used. It is clear that many parts of this writing system are still unknown and future studies will help us to improve the current studies.

In the following I present four unpublished seal impressions found during a survey of the Proto-Elamite tablets in the National Museum of Iran.

The Proto-Elamite writing system

The *PE* writing system includes signs that represented either numerical or non-numerical concepts. It illustrates obvious similarities as well as significant differences to proto-cuneiform, which means that there is some interaction and adaptation between these two systems. The Proto-Elamite horizon has a greater geographical distribution than the proto-cuneiform

horizon, again reflecting a distinct administrative structure within the Iranian plateau in the late fourth millennium BC (Desset 2016: 70). The first attempts for deciphering the *PE* writing system were based on the similarities with the proto-cuneiform texts, which led to deciphering the numerical sign and helped to understand some ideographs. Now scholars distinguish about four categories of signs in *PE* writing system: numerical signs, object signs, individual/institutional owner signs, and possible syllabic signs (see Damerow & Englund 1989; Dahl et al. 2013; Desset 2016). The signs recorded on the PE tablets show a great variety. This can either be considered as a lack of standardization or as the lack of available resources for study. The symbols used to describe the text of the tablets in this article are named based on their names in list of symbols that Dahl published in the CDLI.

"The content of all Proto-Elamite texts is administrative and all of the extant texts relate, in one way or another, to the production, storage and distribution of food, with no evidence of craft production or the procurement of raw-materials" … "This may not be surprising, as the early states which produced these texts would be primarily interested in agricultural matters, but is nevertheless at odds with our traditional understanding of Mesopotamia's eastern neighbor as a supplier of raw materials such as stone and wood to the resource poor alluvial settlements" (Dahl 2015: 45).

Clay tablet 1

Grey/brown rectangular clay tablet with sharp corners (dimensions: 5×4.2×1.2 cm). Only the obverse of this tablet was published as MDP 26 338 (fig. 3). The original is kept in the National Museum of Iran in the Inscription Storage and was given the number BK3392 (fig. 1-2).

The seal impression found on the reverse was not included in Scheil's publication from 1935 (MDP 26 338). Part of the surface of the obverse has disappeared since the publication of Scheil. The text has a header[1] (M327+M320[2]) followed by a now partially lost entry recording most

[1] For more information on terms used to describe different signs in the Proto-Elamite writing system see Dahl 2018.

[2] The sign names follow the Proto-Elamite sign list of Meriggi with further improvements and additions by Jacob Dahl see http://cdli.ox.ac.uk/wiki/doku.php?id=proto-elamite_period.

likely an institution or person related to workers. The first sign following the header is M388, hypothesized as an Iranian equivalent of Mesopotamian KUR_b standing for a dependent worker. Due to the break and the poor quality of Scheil's copy, it is unclear whether the text has one or two entries. Following the break, an amount of cereal is recorded on this tablet. The text has a subscript, $M131_e$, the most common of all subscripts in Proto-Elamite texts.[3]

On the obverse of the tablet, which is badly broken, only signs are found and no impression of the seal is visible. On the reverse the familiar scene of a goat and stairs but with goat representation with triangle details on its body stepping on the first step of a three-step platform is visible. The goat is facing toward the stairs to the side of which a cross symbol can be seen. Except for the stepped platform, the rest of the impression is well preserved. The most interesting feature of the impression is the technique of engraving, in which triangular shapes are used to render an abstract pattern on the body of the goat. A similar scene, but with a clear different illustration style, can be seen on the clay tablet 3, published here.

A seal depicting a goat rising up, impressed on a tablet with the content of an individual/institution account of workers, belongs to the classic-group of Proto-Elamite sealings. In addition, this is a rearing animal scene, which is the CPE 1 sub-group according to the Roach system of categorization (Roach 2008: 353).

Table 1: BK3392, sealing motifs (comparison).

MDP 26 338; BK3392	Impression type (Group/sub-group)	Similar motifs
Goat standing in front of stairs	Classic/CPE 1	Roach 2008: 130, no. 790; Ibid. 134, no. 819; Mutin 2013: fig. 5.5, TY. 8, 9, 10, 15, and 18-CAT.27

Clay Tablet 2

Upper half of a rectangular tablet with light brown color (dimensions: 4.5×4.4×1.5 cm). Obverse and part of the reverse was published as MDP

[3] See Hawkins 2015 for subscripts in Proto-Elamite.

Fig. 1. BK3392 (photo by author).

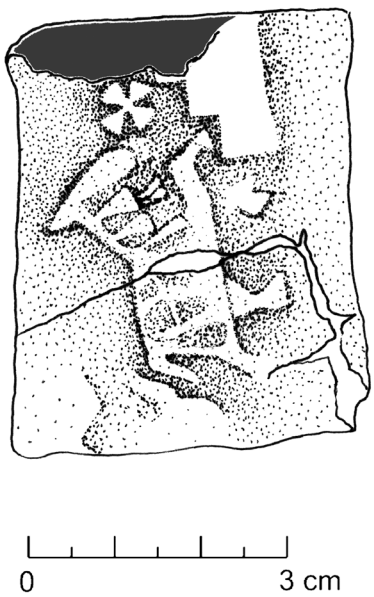

Fig. 2. BK3392 (drawing by author).

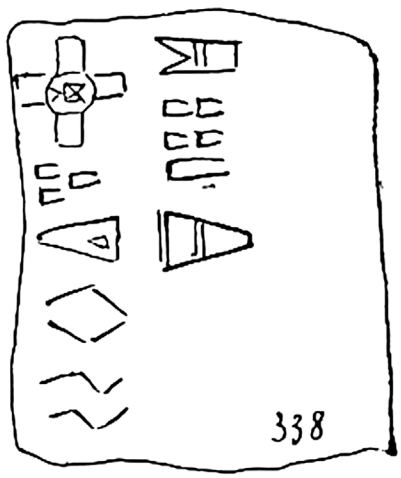

Fig. 3. Published in MDP 26 338.

26 316 (fig. 6), the original is kept in the National Museum of Iran in the Inscription Storage and was given the number BK3370 (fig. 4-5).

The text lists small rations of cereal products to individuals associated with various institution signs for each part of cereal amount. The first entry following the header begins with a variant of the so-called 'hairy-triangle' sign, which has been assumed to be a sign used to identify a high-ranking person or institution in Susa due to its occurrence on seals together with an iconography suggesting a high rank, and its association in texts with high level administration (Dahl 2013; Lamberg-Karlowsky 1986).

A little over half of the text on the obverse is preserved. On the reverse is found the remainder of a numerical notation, most likely part of the total. A seal impression is found below the total. The placement of the seal impression shows that is was made after the text was inscribed and that the scribe tried not to disturb the text. The seal impression shows a roaring lion with its head turned backward toward a bull and with one of its legs raised. Above the back of the lion is a plant with three leaves. The head of the bull is clearly visible, but the depiction of its body is not well preserved. It is well known that lions are a common motif in the glyptic record of the Proto-Elamite horizon. Such animals are also commonly found in the context of high-level administration, ration distribution, and the distinctive 'hairy-triangle' sign. The lion and bull in the sealing and the 'hairy-triangle' sign in the text would be a combination which is seen with different position in the high-status tablet published as MDP 6 5242 and P272825 in the CDLI collection. As Dahl puts it, "High ranking members of the Proto-Elamite society were represented by either lions or bulls" (Dahl 2014: 3).

A seal containing the image of a lion turning its neck, roaring[?] at a bull, sealing a tablet listing ration of cereal products should be placed in the classic-group of Proto-Elamite sealings. In addition, this is an animal scene which is classed as belonging to the CPE 3 and 4 sub-group for double animal according to Roach's categories (Roach 2008: 353).

Table 2: BK3370, sealing motifs (comparison).

MDP 26 316; BK3370	Impression type (Group/sub-group)	Similar motifs
Lion turning its neck, roaring at a bull	Classic/CPE 3-4	Legrain 1921: 69, Pl. X fig 161; Roach 2008: 142, no. 880

Fig. 4. BK3370 (photo by author).

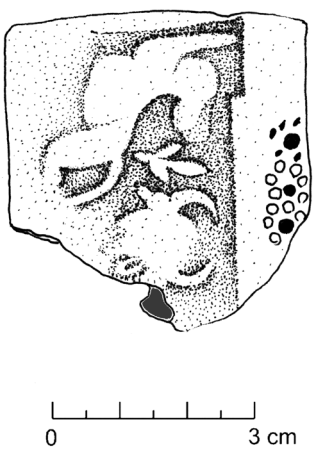

Fig. 5. BK3370 (drawing by author).

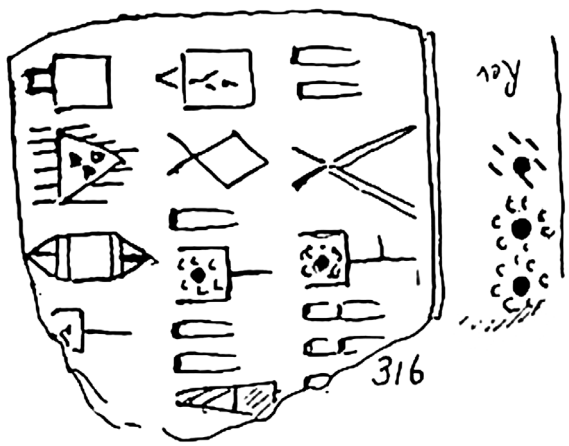

Fig. 6. Published as MDP 26 316.

Clay Tablet 3

Light brown, pillow shaped clay tablet with sharp corners (dimensions: 6.4×3.3×1.7 cm). Only the obverse of this tablet was published as MDP 26 457 (fig. 9), the original is kept in the National Museum of Iran in the Inscription Storage and was given the number BK3511 (fig. 7-8).

This seems to be an early period Susa tablet, comparable to many of the tablets published in MDP 17 and presumably belonging to the period defined in the stratigraphic excavations as Acropolis level 17x. The text contains only one entry, consisting of a non-numerical sign and a numerical notation, probably in the Capacity System. The numerical sign is comparable with later forms of numerical signs, but the only non-numeric sign seems to be an early period sign which changed during time. The non-numerical sign is not a hapax[4] (it is found also in MDP 26 445 which does not have a sealing); it appears to be an early version of either M188 or M193.

Impressions of a seal on both sides and long edges of the tablet preserve an almost complete scene. On the obverse is found four signs which can be identified as early forms of the Proto-Elamite script. It is obvious that the seal was impressed before the signs were inscribed. An incomplete image of a bull in the middle of the reverse shows that the seal was taller than the width of the clay tablet. In the middle of the reconstructed seal image we see a standing bull facing right toward a stepped platform. A plant with leaves emerges from the top of step. Above the bull's back is a large triangular form with an inverted smaller triangular base. Behind the bull's tail is a thin slightly curved line. On the reverse of the tablet is the remainder of the scene. From the left, the platform is visible with the plant emerging from the top. To the right a goat rears toward a stepped form with a plant on top of it. Behind this animal is a standing figure, either a bull or a feline, facing toward the goat with its front hooves or paws held together at his chest. To the right is a faint suggestion of what might be the feline suggested on the obverse by the curving line. To judge from the impression, this was a very large seal. The damage prevents us from deciding the exact shape of the plant, but in its current state it has four branches.

Considering the three scenes described and the difference in the dimensions of the scenes, due to the remaining effect of the seal/s on the tablet,

[4] In corpus linguistics a hapax is a sign that occurs only once within a context.

Fig. 7. BK3511 (photo by author).

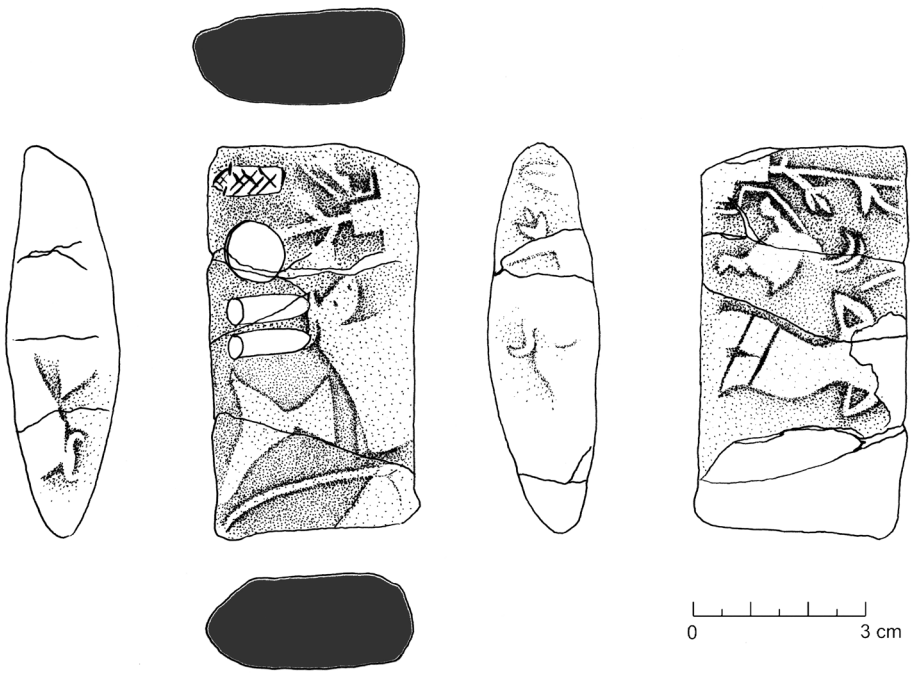

Fig. 8. BK3511 (drawing by author).

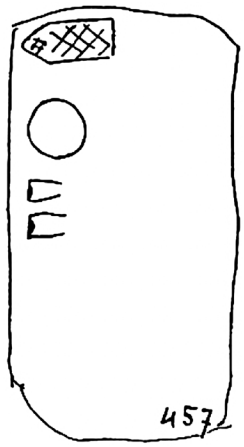

Fig. 9. Published as MDP 26 457.

it would be possible to mention that maybe this tablet is not sealed with one seal, but that at least two or three seals with different subjects can be seen on the tablet. The bull and upper triangle dimension are big; the human-like figure is the same; but the goat and its plant seem to be smaller than the two other scenes. It would led us to argue that this tablet is an early one and after bullae, which sealed by different sealing, using two or more seal for sealing a clay tablet with just one entry seems to be possible.

A sealing on a tablet with content of one entry counted in the Capacity System should be categorized as belonging to the classic-group of Proto-Elamite sealing. In addition, this scene can be identified as similar to CPE 1 (rearing animals), CPE 3 (single animal) and CPE 8 (animals acting as humans) in the classifying system of Roach (Roach 2008: 353).

Table 3: BK3511, sealing motifs (comparison).

MDP 26, no. 457; BK3511	**Impression type (Group/sub-group)**	**Similar motifs**
Goat stand in front of stairs	Classic/ CPE 1	Legrain 1921: 80, Pl. XXI figs. 317; Roach 2008: 134, no. 819; Pittman 1997: 156, fig. 4c
Animals acting like humans	Classic/ CPE 8	Legrain 1921: 82, Pl. XXIII figs. 336-337; Roach 2008: 165, 1035; Ibid. 166, 1040; Pittman 1997: 156, fig. 4c
Single cow?	Classic/ CPE 3	Roach 2008: 145, no. 899

Clay Tablet 4

Brown, rectangular clay tablet with sharp corners (dimensions: 6.2×4.5×1.6 cm). Only the obverse of this tablet was published as MDP 26 30 (fig. 12), the original is kept in the National Museum of Iran in the Inscription Storage and was given the number BK3580 (fig. 10-11).

This is a short receipt of 6 workers receiving an amount of cereal written in the Capacity System ($3N_{39b}$ $1N_{24}$ $1N_{30c}$ $1N_{30d}$). As such, the workers in this text receive slightly more than usually for workers in the so-called plough texts (discussed by Englund & Damerow 1989: 27, and Dahl 2019: 87). The disbursement is probably rations for one month. Similar to the plough texts, this text has a subscript; all plough texts have a top edge inscription (1N34) but in this tablet there has not. The transaction belongs to a frequently attested institution or household, designated by the sign M157.

The reverse is completely covered by a seal impression. The almost complete seal impression shows part of a scene depicting two goats. The two animals are depicted with one overlapping the other. Between the legs of each animal an abstract motif, almost like a mustache, is visible. Above the body of the first goat, the outline of another symbol, a lozenge, is depicted. In front of the animal scene we find an abstract shape, which almost certainly should be interpreted as mountains, depicted by six semi-circles. Next to the abstract mountain a standing figure is seen with its front hooves or paws held together at its chest, and with a long tail. It looks like an animal that acts as human.

A sealing on a tablet with the same content as the so-called plough text should be grouped with the classic-group of Proto-Elamite sealings. In addition, as its motifs are too complex to identify just one sub-group, according to Roach 2008 it belongs to CPE 3-4 (for animal files) and CPE 8 (animal acting like humans), sub-groups (Roach 2008: 353), also some unclassified abstract motifs.

Table 4: BK3580, sealing motifs (comparison).

MDP 26 30; BK3580	Impression type (Group/sub-group)	Similar motifs
Animals acting like humans	Classic/ CPE 8	Legrain 1921: 80, Pl. XXIII figs. 336-337; Roach 2008: 165, 1035; Ibid. 166, 1040; Pittman 1997: 156, fig. 4c
Double goats	Classic/ CPE 3	Roach 2008: 144, no. 894

Fig. 10. BK3580 (photo by author).

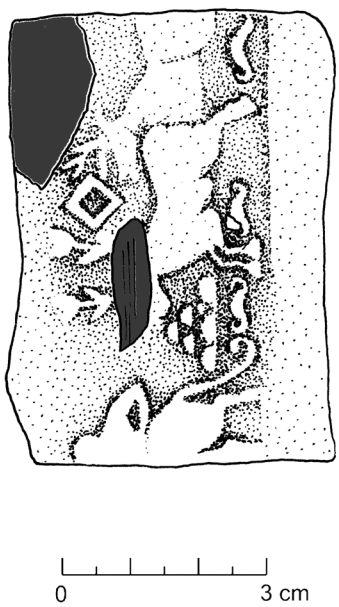

Fig. 11. BK3580 (drawing by author).

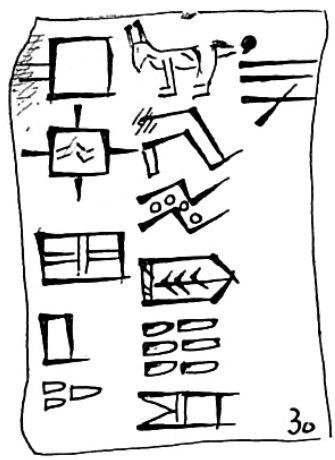

Fig. 12. Published as MDP 26 30.

This same seal is found rolled on three other tablets (fig. 13). The initial sign (header) that shows the whole transaction belongs to a household/person (Dahl 2018: 388), which is identical in these three tablets (M157). Also, the shape of the signs, and the stylus that were used for writing them, seem to be similar. These three tablets seem to be related to rations for workers in the plough texts. All these texts end with the same sub-script (broken on MDP 26 42) and concern rations for small teams of workers. Such complex texts with a long non-numerical sign string would date to the latest part of the Proto-Elamite period.

MDP 26 31 (fig. 13, left) is very similar to the plough team texts described first by Damerow & Englund 1989 and Dahl 2015. There are some differences in the signs for the workers, it has a subscript just like the plough texts have, but it is slightly different in details. The second text, MDP 26 42 (fig. 13, middle) is perhaps identical, but is unfortunately broken in the crucial place.

The similar structure, content, and seal impressions suggest the possibility that they belonged to an archive in a specific institutional administrative unit. However, that does not mean that every text belonging to this institution should also be sealed with this specific seal. For example, MDP 26 33 with an identical header, and other signs similar to our sample, uses a different seal (fig. 14). It seems that those who wrote the lists and those who sealed were not always the same individuals/institution.

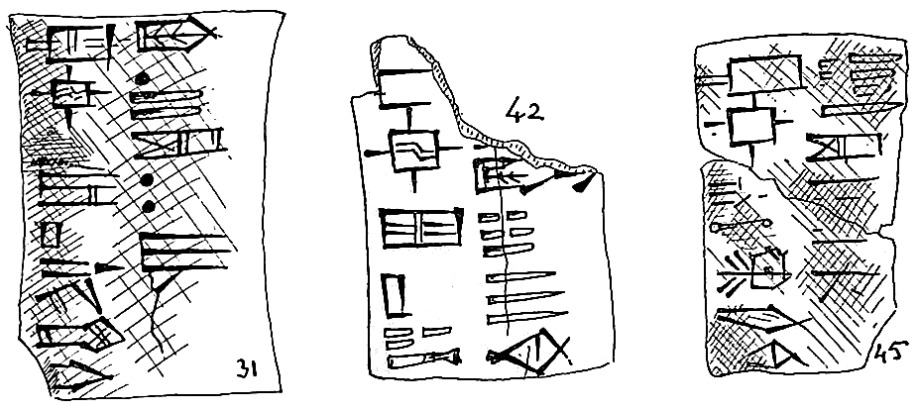

Fig. 13. From left to right: MDP 26 31 = BK3581; MDP 26 42 = BK3592; MDP 26 45 = BK3595.

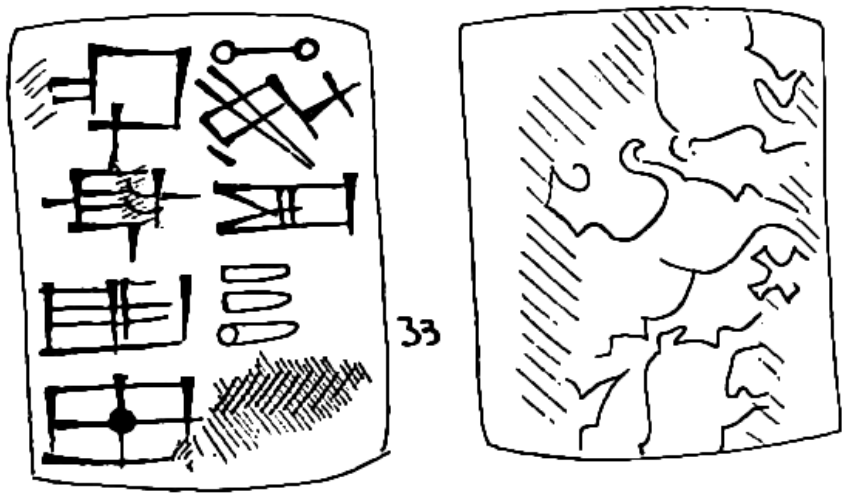

Fig. 14. MDP 26 33.

Conclusion

Sealings help us to understand the imagery of different eras, and the use of seals adds information of other kinds. Most of the extant Proto-Elamite sealings and tablets were found in large and un-stratified excavations at Susa. Due to the number of finds and the lack of appreciation of their importance, early scholars neglected the publication of the sealings together with the inscriptions. In this study, I have reviewed four unpublished sealings on the Proto-Elamite tablets in the National Museum of Iran. On a basic level it shows the importance of renewed study of the glyptic of the period and the objects held in the museum's collection.

In this study the first aim was to the publish the missing information and to add to the limited inventory of seal impressions for this period, but a second and equally important aim was to trace the possible relationship between the sealings and the content of the tablets. The realistic scenes of the seals from the Susa II period were replaced by the symbolic scenes of the Proto-Elamite period. From this period, we have access to a new line of data from the texts.

Tablet 1 recorded an individual/institution with related workers and carried a sealing with a simple scene of a goat stepping onto a two stepped stair that could be interpreted as a mountain. The amount of cereals recorded in the text is mid-size and shows that this neither a high or low quantity account for workers. The relatively simple scene on this seal can possibly be connected to the administrative level of the transaction recorded in this tablet, which would suggest an overlap between complexity and status.

Tablet 2 can be suggested to relate to a somewhat higher level of the administration through the occurrence of the so-called 'hairy-triangle' sign and the motif of the seal impression. However, the text itself records small rations of cereals to individuals associated with various institutions. The scene on the seal includes a lion turning its neck towards a bull, and it is the lion which leads us to identify the motif as belonging to the higher levels of society in the Proto-Elamite period.

Tablet 3 is an early period tablet recording a rather large notation in the Capacity System, presumably of cereals. It is sealed with a large seal with a complex scene containing three parts: a rearing goat in front of a plant located on top of what appears to be an abstract mountain, an animal which is acting like a human with folded hand on the chest, and a single bull with some unclear shapes. The seal which is rolled on four sides of the tablet, adds weight to the interpretation of the document carrying an important message that presumably was made by/for a high-status organization or individual.

Finally, tablet 4 records the rations received by 8 workers. It is similar to the so-called plough-texts. It is a small receipt but it has a seal impression with a complex scene that includes many interesting details. On the seal we find an animal acting as a human, two goats running, in addition to lozenge- and mustache-like motifs, and semicircles that can be interpreted to represent a mountain. Tablet 4 uses a header almost identical to that of tablet 2, and the complex sealing scene in addition to slightly higher than normal ration for workers seems to indicate that it is a receipt belonging to a high status individual/institution. Tablet 4 is identical in content and sealing to three other tablets, but there is also a tablet (MDP 26 33; fig. 14) with similar content but different sealing in the collection. One explanation for such a scenario could be that the receipts were written by the institution that paid the rations, and they were sealed by the one that

received them. The tablets may therefore be receipts from the receiver with their sealing to confirm receipt of the ration.

I hope that in this study I have made useful suggestions of the relationship between the Proto-Elamite tablets and the seal impressions, and perhaps even enough to justify a more comprehensive study of Proto-Elamite tablets and their sealings. By studying the development of the Proto-Elamite writing system and categorizing which seals belong to which phase of the writing system, as well as linking seals and tablets more closely in general, it may be possible to identify motif categories and their possible related specialization. This can be achieved by examining a larger collection of tablets that are sealed. The fact that tablet content is confined to a few limited categories, such as production, distribution, and storage (Dahl 2018) may help us to see if each of these is related to specific seals motifs. Were tablets listing contents of cereals or livestock sealed with different symbolic scenes? Was a specific scene used in conjunction with a specific institutional sign on the tablet or not? Of course, examining these points requires a larger collection of sealed tablets, which we hope will be possible by studying the collections from different sites.

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KHOREZM'S DARK AGE IN THE 3RD TO 6TH CENTURIES CE

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Abstract: This paper gathers information on a period of region-wide settlement abandonments in the 3rd-6th centuries CE in Khorezm. Soviet archaeologists characterized this period as a dark age, and sought explanations for culture change based largely in processes of migration. More recent evidence from environmental studies of the Aral Sea littoral suggests that changes in the local ecology and climate may have played a substantial role. The existing evidence is reviewed, and a case is made for further attention to the diversity and heterogeneity of cultural responses to environmental change within the Khorezmian deltas.

Keywords: Khorezm; Aral Sea; Abandonment; Dark Age; Early Medieval

Introduction

The 3rd-6th centuries CE has been characterized as a dark age in Khorezm when many of the region's settlements were abandoned (Nerazik 1997). The scarcity of archaeological remains has made it a difficult period to study (Tolstov [1962: 236] called it an "abyss"), but also an important one because it precedes dramatic cultural changes in the early medieval period (6th-8th centuries CE). Recent evidence suggests that shifts in the local environment played a central role in these culture changes. In this article, I present the current archaeological and environmental evidence from this tumultuous time in Khorezm. I propose that interactions between culture and environment were critical to the transformations that took place during Khorezm's dark age.

Explanations for the gap in Khorezm's archaeological sequence in the 3rd to 6th centuries CE emphasize migration as the major cause for culture change. For example, Tolstov (1962) argued that Khorezm's decline was connected to the "great migrations of peoples" across Central Asia in the 4th to 5th centuries CE, when migrating groups of eastern nomads disturbed life across the continent. More recently, Yagodin (2008a, 2008b) and

Nerazik (1997) focused specifically on the possible migrations of neighboring cultures from the Syr Darya delta (the Djety-asar culture). These theories tend to rest on a limited corpus of archaeological data, drawing connections primarily via stylistic parallels in burial arrangements, pottery, and architectural forms. The current data on environmental change in this period is more substantial, and it suggests that the environment may have been a major catalyst for culture change. It is plausible and likely that social responses to these changes included migration, but the current state of the archaeological record makes it difficult to understand these events in greater detail.

Environmental change in the 3rd to 6th centuries CE

The environmental dynamics of Khorezm are complex across time and space (Brite 2016). This is in large part due to the endorheism of the Aral Sea Basin, which, in addition to or apart from any larger-scale patterns of regional climatic change, introduces microclimate impacts as a result of shifting lakes and other water bodies. The potential correlation of ancient settlement patterns to this locally-dynamic geomorphology has recently been more precisely traced by Dodson et al. (2015). In that example, irrigation development, site formation and abandonment at Akchakhan-kala (ca. late 3rd century BCE – 2nd century CE) has been shown to align with patterns of lake transgression and regression of the local Isthemes/Akchakul basin; historical accounts suggest that the fluctuations in this basin were likely a constant and influential environmental factor impacting human inhabitation in this part of Khorezm up to the 20th century (Dodson et al. 2015: 67). Notably, there is progressive drying of the Isthemes/Akchakul basin in the 2nd century CE, in the lead-up to the period in question (the 3rd-6th centuries CE).

Multiple additional lines of evidence suggest that there were dramatic changes in Khorezm's natural environment in the 3rd to 6th centuries CE. These changes included a reorientation of the water channels of the Amu Darya delta towards the west, a warming regional climate, and changes in species composition in local ecosystems. Data from the archaeological record has been integral to identifying and tracing the environmental trends, suggesting that these natural phenomena had direct impacts on human activities.

First, there is evidence that flows of Khorezm's main river, the Amu Darya, moved to the west in this period. This is demonstrated by archaeological surveys that show water briefly returned to the dry Uzboi River in the west, while at the same time Khorezm's irrigation network receded in the east. In the west, the Uzboi River is an extinct waterway that once connected Khorezm to the Caspian Sea (Letolle et al. 2007; Olbrecht 2010; Tolstov & Kes 1960). Throughout most of the 1st millennium BCE and the early 1st millennium CE, the banks of the Uzboi were uninhabited, but beginning in the 4th century CE new sites appeared along this river, suggesting that the water may have returned to these western channels (Tolstov 1962: 233-235; Tolstov & Kes 1960: 316-319, 323-325).[1]

At the same time in the east, Khorezm's once extensive irrigation system stopped functioning. Archaeological surveys of this system in the lower Akcha Darya delta show that most of the major canals – the Gavkhor, the Kirk-kiz, the Yakke-Parsan, and the Tash k'irman – all ceased to flow either entirely or nearly entirely around the 4th century CE (Andrianov 1969: 137; Guljamov 1957). Sites along the canals were abandoned. More extensive studies of the regional settlement pattern show a broad trend towards new habitations forming in the western portions of Khorezm, suggesting that people followed the water westward over the ensuing centuries (Boroffka 2010: 287).

Recent environmental studies of the Aral Sea littoral further confirm this pattern of change. A number of environmental proxy measures show a regression in the Aral Sea's water level that may have reached as low as 10 m.a.s.l. by the 6th or 7th centuries CE (Krivonogov et al. 2014: 298; see also Asarin et al. 2010: 112; Boomer et al. 2000: 1269; Boomer et al. 2008, Boomer et al. 2009; Boroffka 2010: 295; Cretaux et al. 2013; Kes 1995: 9; Krivonogov et al. 2010; Letolle et al. 2007; Oberhänsli et al.

[1] Two fortress sites along the Uzboi River that date to the 4th-5th centuries CE provide evidence for this – Kanga kala in the western oasis, and Igdy kala in the far west of the Kara Kum desert (Tolstov 1962: 233-236; Tolstov & Kes 1960: 319-325). Igdy kala appears to have been positioned to control water flows along the Uzboi. In the 9th-10th centuries CE a more substantial network of caravanserai sites appears along this waterway, but these may have relied on wells; data compiled by Krivonogov et al. (2014: 297) indicates the infilling of the Uzboi River ended by the 6th or 7th century CE.

2007; Sorrel et al. 2006).[2,3] This data likely correlates to the archaeological evidence for a westward shift in the river network at that time. Recent dating of sediment layers from the northeastern shore of Lake Sarykamysh corroborate a brief influx of water to this western region in the 5th-6th centuries CE (Krivonogov et al. 2014: 297).[4] Besides moving the main sources of freshwater, these hydromorphic changes probably had other, significant impacts on local ecosystems, not unlike the dramatic effects of the Aral Sea's regression in modern times (Glantz 1999; Kostianoy & Kosarev 2010; Micklin 2007: 2010).[5]

Finally, additional environmental data indicate that there were also significant climate changes in Khorezm in the 3rd to 6th centuries CE. High-resolution (~50 year) pollen analyses from sediment cores retrieved near the Aral Sea show a shift to warmer, moister conditions and more steppe-like vegetation by the early 5th century CE, indicating that the climate became milder and there was an increase in annual precipitation (Sorrel et al. 2007: 366; Surkova 2010: 94-95). As a result, the vegetation cover grew denser, altering the species composition in local ecosystems. At the regional scale, concomitant warming trends in the piedmont and mountain zones of Central Asia associated with a broader Middle Ages Optimum

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[2] By comparison, the Aral Sea is proposed to have stood as high as 54 m.a.s.l. during major transgressions, based on the lake's full Holocene record (Krivonogov et al. 2014: 298).

[3] These proxy measures include examinations of the Aral Sea's stratigraphic lithology, the geochemistry of lake sediments, and paleontological strata. The modern disappearance of the Aral Sea has led to an increase in these environmental studies, especially as part of the EU-INTAS/DFG Project CLIMAN, https://www.gfz-potsdam.de/en/section/climate-dynamics-and-landscape-evolution/projects/completed-projects/aral-sea-intasdfg-project-climan/. CLIMAN project researchers have drawn special attention to the capacity of the Aral Basin for hydromorphic change, and have documented numerous such changes in both prehistoric and historic times.

[4] Letolle et al. (2007) conducted a hydrological study of the Uzboi River that suggests it carried some, but not all, of the Amu Darya's flow during regressions. They examined another regression in the 16th century CE and determined that some of the excess water flow dispersed into the Zaunguz desert east of the Uzboi. Some additional flow may have also continued to dispense into the Aral Sea via the Amu Darya, but at a reduced volume. It seems plausible that a similar, though not identical, flow pattern may have existed during the 5th-7th century CE period of regression.

[5] The role of anthropogenic change in Aral Sea regressions is widely discussed, with increasing acceptance that Khorezm irrigation in antiquity and medieval times was an important contributor to premodern regressions. See most recently Cretaux et al. (2013) and Krivonogov et al. (2014).

also had the possible effect of increasing the volume of water transmitted in seasonal flows of the Amu Darya River (Oberhansli et al. 2007: 173; Surkova 2010: 94-95).

These changes in hydrology, climate, and ecology in Khorezm during the 3rd to 6th centuries CE were undoubtedly significant for local populations. From the current evidence, it appears that the movement of the river's waterways to the west may have pushed inhabitants to abandon some areas of major habitation in the eastern, Akcha Darya delta (previously Khorezm's agricultural heartland) and settle in other parts of the region. Climate change and associated changes in local ecosystems also likely encouraged people to alter many of their daily practices, especially their subsistence regimes. In particular, changes in annual precipitation rates and in the seasonal inundation patterns of the Amu Darya River, as well as more localized changes in the Isthemes/Akchagul and other small lake basins, probably had important consequences for both agricultural and pastoral production regimes. The scientific data now makes it relatively clear that many of these changes were well underway by the early 5th century CE, if not earlier.

The Archaeology of Khorezm in the 3rd to 6th centuries CE

If environmental change was a major catalyst for the cultural transitions of the 3rd to 6th centuries CE, then a central question concerns how local populations adapted to change and how their adaptations shaped the emergence of Khorezm's early medieval cultures. Migration is one possible and very likely scenario, but it is not the only one, and it may not explain all of the culture changes that occurred.[6]

Unfortunately, it has been extremely difficult to understand these responses in greater detail because archaeological remains from this period are not plentiful. There are only a few sites with stratified remains, and these are found scattered across a wide region. Information on settlement activities is therefore minimal. Data on subsistence strategies, which are

[6] Soviet archaeology has tended to over-emphasize migration in explanations of culture change (Hiebert 2003: 7-8; Anthony 2006; Frachetti 2011). The variety of possible alternative human responses to environmental change have been cogently summarized by a number of anthropologists and archaeologists (Halstead & O'Shea 1989; Marston 2011; Whallon 2006; Winterhalder et al. 2009), and deserves further consideration in Central Asian contexts.

especially critical for understanding how local populations adapted to environmental change, are also lacking. The only clear patterns appear to be an extreme heterogeneity among practices at sites across the region, and a general trend towards settlement abandonment and possibly, population declines.

The following sections provide a summary of the current archaeological evidence for settlement activities in the 3rd to 6th centuries CE in Khorezm, with particular attention to inhabitants' adaptive strategies. I divide this record into three sub-regions: the eastern oasis (the lower Akcha Darya delta), the northern oasis (the Aral, or lower Amu Darya, delta), and the western oasis (the Prisarykamysh delta). These sub-regions are delineated by both the natural formation of the Aral Sea's alluvial-deltaic complexes (Asarin et al. 2010: 113) and persistent patterns of human occupation and land-use in prehistory (Pl. 1).

The Eastern Oasis – The lower Akcha Darya delta

In the Antique period (4th century BCE – 3rd century CE), the lower Akcha Darya delta was the epicenter of Khorezmian life and culture and the principal location for intensive agricultural production (Helms et al. 2001, 2002; Betts 2006; Khozhaniyazov 2006). By the 4th century CE most of this had disappeared. A few sites give a picture of life in the lower Akcha Darya delta in this dark period: Toprak kala, Ayaz kala 2, Bezymiannyi zamok, and Kara-tepe. From these remains, it appears that people re-inhabited or continued to live in a small number of the Antique monuments, but they adapted them to suit much smaller, extemporaneous habitations. Many people may have transitioned to mobile or semi-mobile lifeways.[7] Changes in ceramics assemblages suggest changes in the operation of craft production and in consumption activities, and a still emerging record of archaeobotanical and faunal remains hints at significant modifications of agricultural production regimes.

[7] Some Antique *qala* fortification sites, such as Duman kala and Eres kala, have unstratified deposits of 4th-5th century CE ceramics that are not associated with habitation remains (Nerazik 1959: 83), indicating occupation activities that are difficult to define.

Ayaz kala 2

Ayaz kala 2 is a forty room building dated to the 4th and 5th centuries CE. Elements of the building suggest elite and ritual activities, but other aspects indicate relatively short-lived periods of occupation. The building contained several columned halls, remains of wall paintings, and rooms with serving vessels and fire imprints on the floor suggestive of ritual feasting (Rapoport et al. 2000: 72). These habitation activities came to an abrupt end in the 5th century CE, when several of the rooms of the original building were bricked up. In a second phase, one-room frame houses were constructed inside the largest columned hall. Nearby to the south, plowed fields roughly dated to the 5th to 8th centuries CE may have been contemporaneously cultivated (Andrianov 1969: 135; Nerazik 1976: 38).[8,9]

Ayaz kala 2's occupation sequence may be best understood with reference to the valuable landscape that surrounds the site. This area is an easily defensible location wedged in between the Sultanuizdag Mountains and Ayaz-kul Lake, where multiple resources are available. Several other older, abandoned forts in the vicinity provide protected spaces that can be used for defense, storage, or as animal enclosures. These other forts, which all date from different periods from the early 1st millennium BCE through the 8th century CE, reveal a pattern of continual abandonment and re-habitation of the Ayaz kala landscape (Bolelov 1998).[10] When viewed in this wider

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[8] Farmsteads of the first centuries CE are also identified in this area (Nerazik 1976: 38-39). The imprecise date of the agricultural fields and the presence of other, earlier traces of settlement and cultivation make it unclear whether cultivation activities can be associated with Ayaz kala 2.

[9] A settlement was also excavated just south of Ayaz kala 2, but it is not certain that it is contemporary with the Ayaz kala 2 building (Nerazik 1997; Rapoport et al. 2000: 75-76). Although often described as part of the same "complex", the settlement may have been inhabited after the Ayaz kala 2 building's initial abandonment. Dates for the settlement are sometimes reported as "4th to 8th centuries CE" but more specific descriptions place it in the late 6th or the 7th to 8th centuries CE (Nerazik 1976: 38; Nerazik 1997; Rapoport et al. 2000: 74). A date in the 7th to 8th centuries CE may make the most sense, given that the branch of the Gavkhor canal that waters the Ayaz kala area may not have been active again until that time (Nerazik 1976: 41-42). There have been suggestions that the Ayaz kala 2 building and this settlement together comprised the early medieval capital *al-Fir* described by the Arab historiographer al-Biruni (al-Biruni 1879; Rapoport et al. 2000: 69-70), but this seems unlikely given that the contemporaneity of the building to the settlement is not well established.

[10] A brief review of the settlement history of Ayaz kala has been published in English by UNESCO. See Gandreau & Bendakir (2006). Another, nearby site worth mentioning in

context, the activities at Ayaz kala 2 can be seen as just one of many instances when people may have temporarily made use of this advantageous setting. In the 4th-5th centuries CE, this usage appears to have involved the movement of people into and out of this landscape, perhaps in search of resources.

Toprak kala

In the late Antique period (1st-3rd centuries CE), Toprak kala was an elite residence, richly embellished with multi-chromatic wall paintings, statues, and cultic features, that overlooked a centrally-planned, walled settlement (Nerazik & Rapoport 1981; Rapoport 1994; Rapoport & Nerazik 1984). By the 4th century CE, almost all of this elaborate architecture was abandoned and only a portion of the settlement in the lower part of the complex survived (Nerazik & Rapoport 1981: 143-147). Here, irregular architecture was constructed atop an abandonment layer, laid out so as to maintain the functional designations of the original settlement.

Besides the striking decline in occupation activities, specific features at Toprak kala suggest other significant changes in the 4th to 5th centuries CE. Defense may have been increasingly important, as the fortifications of the site were reinforced in this period with a single, strong brick wall with single-story gallery. Changes in domestic life are also apparent. New architectural elements appear, most notably the use of *sufas* (mud brick benches) along the interior walls of households. In addition, the ceramics at the site change remarkably in the 4th to 5th century CE layers. Earlier forms and styles continue, but the pastes of the wheelmade ceramics are more heavily-tempered, vessels are poorly fired, and handmade ceramics become noticeably more common, all suggesting major changes in production technology (Nerazik & Rapoport 1981: 91). A distinct change in the vessel repertoire – from cups and goblets to double-handled and single-handled pitchers, mugs, and jars – and the appearance of a new type of roasting brazier

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this regard, though lacking layers specifically dated to the 3rd-6th centuries CE, is Bolshoi Kirk Kyz kala (Kitov, Bolelov & Balakhvantsev 2019; see also Andrianov 1969; Nerazik 1966). Noteworthy at this site is the appearance of metal and ceramic workshops outside the Antique period fortification, which are associated with re-inhabitation in the 7th century CE (Nerazik 1966: 100-104). The metal workshop in particular may indicate a developing interest in extraction of iron ore resources from the Sultan-Uizdag Mountains during, and possibly leading up to, this time period.

suggest significant changes in food preparation and food consumption practices, indicating important shifts in local culture related to resource use (Nerazik 1959: 252; Nerazik 1997: 48; Nerazik & Rapoport 1981: 145).

Bezymiannyi zamok

Bezymiannyi zamok (*Russian*, "the nameless castle") is a thirty room building located along the Yakke Parsan canal (Rapoport et al. 2000: 87-89). The internal architecture at this site is highly dissimilar from other sites in the eastern oasis, possibly suggesting a distinct type of social relations. The building consists of a series of two- and three-room suites, each with a separate, eastern-facing entrance and nearly identical layout. Several, internal columned halls lay opposite these suites. Inside the suites there were traces of domestic activities, with each suite containing a storage room and a room with two hearths.

The arrangement of spaces at Bezymiannyi zamok suggests that each suite functioned as its own residential unit. The repetition of separate but identical residential suites seems to hint at collective or egalitarian relations among its inhabitants. A stern and simple exterior architecture also suggests that these inhabitants were concerned with defense from outsiders. Interestingly, the unusual spatial arrangements of Bezymiannyi zamok are repeated in a more elaborate form at the nearby site of Yakke Parsan in the 7th to 8th centuries CE (Rapoport et al. 2000: 82, 88), suggesting that this relatively small and isolated site may have been the prototype for a unique kind of settlement organization in the 4th to 5th centuries CE that appears more clearly in this part of the eastern oasis in early medieval times.

Kara tepe

Kara-tepe is a one hectare, Antique period, *qala* fortification with the remains of a 4th to 5th century CE habitation adjacent to its southeastern exterior wall. The site is located west of the Tash-k'irman oasis (Helms et al. 2001), possibly at the terminus of the Kyatskii canal, an early medieval irrigation system associated with several other, uninvestigated sites (Guljamov 1957: 100).

Excavations were conducted at Kara-tepe by the author and G. Khozhaniyazov (Institute of the Humanities, Karakalpak Branch of the Uzkbek Academy of Sciences) in 2008 and 2009. Our work indicated that a small

population probably inhabited and modified an older Antique fortification in the 4th to 5th centuries CE, building at least one domestic structure just outside the fortification wall (Brite & Khozhanijazov 2009; Brite et al. 2017a). The abundant record of carbonized archaeobotanical and faunal remains recovered from this household gave unusual insight into domestic subsistence practices. The data showed that Kara-tepe's inhabitants grew drought-tolerant crops such as millet (*Panicum miliaceum* L. and *Setaria italica* L.), cotton (*Gossypium arboreum* L. or *G. herbaceum* L.), and barley (*Hordeum vulgare* L.), plants whose growth requirements fit the seasonal inundation cycles of the Amu Darya River (Brite & Marston 2013: 46). Some of the Kara-tepe crops, including cotton and grass/red pea (*Lathyrus sativus* L. or *L. cicera* L.), are the earliest known examples of these crops in the archaeological record of Khorezm. This should not be taken to mean that these remains necessarily represent the first introductions of these cultivates to the region; while this is possible (see Brite & Marston 2013 on this question as it pertains to cotton), it is equally plausible that these cultivates appeared earlier, and that their relative abundance at Kara-tepe was associated with some change in farming regimes, and/or was in some way unique to a single household's practices at this site.[11] In the present discussion, the documentation of large numbers of grass/red pea in the Kara-tepe assemblage is additionally noteworthy,[12] given this cultivate's common status as a famine food and crop replacement in depleted fields (Zohary et al. 2012: 95).

Animal husbandry practices at the site are less clear because Kara-tepe's faunal assemblage is small (number of identified specimens [NISP] =

[11] Archaeobotanical remains have rarely been systematically collected or studied at Khorezmn sites. Exceptions to this include Fedorova's (1960) brief study of palynological data, and reporting on finds of seeds and grains in Vorob'eva (1973), Tolstov (1948; 1962), and Nerazik (1966). In the vast majority of cases, these remains were treated as chance finds and were not systematically collected or analyzed; reporting on these finds is also inconsistent. For these reasons, it is still extremely difficult to say with certainty when particular crops were first introduced in Khorezm and what the patterns of change in crop regimes may have been. See Brite & Marston (2013) and Brite et al. (2017a, 2017b) for more discussion of the archaeobotanical record of ancient Khorezm.

[12] 157 total *Lathyrus* seeds were counted from sub-sampling of a mixed assemblage from Kara-tepe, but more than double this amount remains uncounted in what appears to be relatively homogenous samples collected during excavation. These are likely the remains of grain stores from the conflagrated household.

80).[13] Nevertheless, the variety of taxa identified suggests that a diverse range of animals were exploited, including large and small ungulates (*Bos taurus* L., *Ovis aries* L., *Capra hircus* L., *Cervus elaphus* L., Equus sp., *Sus scofra* L.), hare (Lepirodae), fish (Siluriformes), bird, and tortoise. These livestock production and hunting activities would have been combined with agriculture to meet inhabitants' daily needs.

The Northern Oasis – The Aral delta

The Aral delta is the northernmost portion of the Khorezmn oasis. This region was probably uninhabited until the middle of the 1st millennium BCE, when a channel of the Amu Darya broke through and spilled into the Aral Sea, creating a swampy landscape with numerous small lakes and streams (Yagodin 2008b: 107). Following this, in the Antique period the Aral delta became home to *qala* monuments similar to those found in the eastern oasis (for example, Tok kala and Gyaur kala Mizdakhan (Gudkova 1964; Yagodin 2008b: 108-109)). A major difference between these sites in the northern (Aral) versus the eastern oasis appears to be a lack of agriculture in the former, where it is assumed that subsistence was based entirely on herding, hunting, and fishing (Yagodin 2008b: 107-108). This difference in land-use practices is also suggested by the presence of numerous nomadic cemetery sites (kurgans) in the Aral delta.[14]

There is almost no evidence of settlements in the northern oasis in the 4th century CE. The singular exception is the habitation site of Akchungul', a walled settlement. To the east of this oasis, in the far northern reaches of the upper Akcha Darya, another site, Barak Tam, may provide further insights on settlement processes in the Aral delta in the 3rd to 6th centuries CE.

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[13] Khorezm's faunal record also suffers from many issues related to unsystematic recovery and analysis. See Tsalkin (1952, 1966) for the most comprehensive reports on Khorezmian faunal assemblages. Accurate estimations of species diversity and frequency at archaeological sites require larger data sets than the ones currently available for most Khorezmian sites, including Kara-tepe (Brite 2014: 9-11; Reitz & Wing 1999: 146).

[14] Yagodin (2008a, 2008b), who excavated many of these nomadic cemetery sites in the Aral delta, identified numerous stylistic and osteological features that connect the burials to the cultures of the Syr Darya delta. Nomadic graves in the western oasis may be connected in this sphere as well (Yablonsky 2006: 80-83). The presence of these cemeteries alongside the near-absence of settlement sites in the 4th century CE would seem to suggest this was a period of increased mobility in the Aral delta, perhaps including the arrival of nomadic pastoralists from elsewhere.

Akchungul'

The site of Akchungul' is advantageously located on a promontory of the Ustiurt Plateau, overlooking a series of small valleys (Khozhanijazov 2006: 68; Khozhanijazov 1982; Yagodin 2008b: 111-112). The valleys act as a system of closed drainage basins that collect rain and meltwater at certain times of the year, and the surrounding vertical cliffs provide protective shelter and elevations, features that together seem to make an ideal locale for the grazing of domestic herds (Yagodin 2008b: 111). The architectural planning of the site takes advantage of this landscape for protective defense, abutting a steep ravine on one side and a ditch on the other, with mud brick walls protecting the open approach from the south.

Excavations at Akchungul' revealed that rooms were placed side-by-side along the interior of the settlement's walls, while the central area was open, without architecture. Inside the rooms there were no prepared floors, and instead a layer of ash, manure, and burnt reeds marked the occupational surface. Numerous deposits of animal bones were recovered from all of these rooms, including one room which contained fish bones (Yagodin 2008b: 111).

Yagodin's (2008b) analysis of figurines, ceramics, and a nearby contemporary kurgan burial[15] at this site places it sometime in the late 3rd or 4th century CE. He also notes that the ceramics recovered from Akchungul' most closely resemble pottery from Kanga kala and Kunye Uaz, sites in the western oasis that have a similar, simple fenced perimeter and dense deposits of animal bones. All of these sites are located in areas far from the cultivated plains of the eastern oasis, leading Yagodin (2008b) to suggest that they were inhabited by pastoral groups. The report of fish remains from this site also suggests that marine resources may have been an important element in subsistence strategies at Akchungul'.

Barak Tam

Barak Tam is located in a desolate area on the eastern edge of the northern oasis, in the boundary zone between the Amu and Syr Darya deltas. This particular part of Khorezm was traditionally very sparsely inhabited; up to the 4th century CE, only small campsites were found here. The

[15] These are burials in ceramic and stone ossuaries, which Yagodin (2008b: 112) stated are Late Kushan period forms.

appearance of a site as substantial as Barak Tam in this region in the 4th to 5th centuries CE is therefore noteworthy, and seems to reflect important settlement changes in the oasis in this period.

The site of Barak Tam consists of three fortified keeps (towers for storage or habitation), surrounded by approximately 40 small (two- to three-room) domestic structures spread over a four kilometer area. In its environs were found a pottery production area and an irrigation channel that fed two agricultural fields, which are believed, based on their layouts, to have been used to grow melons and grapes (Nerazik & Lapirov-Skoblo 1959: 81). It is presumed that Barak Tam's inhabitants were semi-settled agropastoralists (Yagodin 2008a: 119), though archaeobotanical and faunal evidence from the site has not been systematically investigated.

Barak Tam reflects a new type of settlement pattern in Khorezm: multiple, small, heavily fortified keeps grouped together and surrounded by habitations. The assumption that the settlement's inhabitants were semi-mobile is based primarily on the architecture of Barak Tam 1, a keep that had traces of felt carpet coverings and niches that resembled arched supports in its interior. It was interpreted to be a fortified, mud brick *yurt* (a nomad tent, Nerazik & Lapirov-Skoblo 1959: 92; Tolstov 1962: 241), where residents could seasonally or periodically erect temporary shelters in a protected, permanent space. Nerazik (2004: 80-81) compares it to similar constructions used in the steppe by contemporaneous Turkic groups.

Khorezmian scholars believe that the Barak Tam keeps were prototypes for later, early medieval (Afrighid) keeps in the eastern oasis, and the site has therefore been an important element in arguments for the migration of outside groups into the lower Akcha Darya delta in the 4th to 5th centuries CE (Tolstov 1962: 239; Nerazik & Lapirov-Skoblo 1959; Yagodin 2008b: 108; Frumkin 1970: 104). Yagodin (2008a: 120) in particular saw connections between the new forms at Barak Tam and elements at Akchungul', Mizdakhan, and other sites of the Aral delta, which he proposed all emerged due to the migration of people from the Syr Darya delta into Khorezm in this period.

The Western Oasis – The Prisarykamysh delta

The western oasis of Khorezm is formed by a series of tributaries that flow from the western banks of the Amu Darya towards the Sarykamysh depression, a low-lying basin located approximately midway between the

Aral and Caspian Seas. The tributaries, the Daryalik, the Daudan, and the Cherman-yab, run roughly east-west through the oasis. Wide, short canals feed from these streams to water small enclosed areas. The organization of the western oasis canal system has led Tsvetsinskaya et al. (2002) to suggest that it may have been constructed to benefit mobile pastoral populations and only secondarily to support agricultural activities.

As in the eastern and northern oases, the Prisarykamysh delta in the late 3rd to early 6th centuries CE experienced regional settlement abandonment. Two sites, Kunye Uaz and Turpak kala 1, suggest continued connections between this area and the eastern oasis, while the remains of a third site, Kanga kala, may hint at the appearance of new groups from outside Khorezm.

Kunye Uaz

Kunye Uaz is a large, Antique period *qala* fortification with upper levels dated to the 3rd-5th centuries CE (Nerazik 1958). In the final occupation phase, most of the site was abandoned. Stratigraphic layers suggest that repeated events of flooding may be to blame (Nerazik 1958: 199; 1976: 19). Whatever the cause, habitations at the site appear considerably more ephemeral in its final phase, perhaps as a result of either population declines or increased mobility among site inhabitants. Along with these habitation changes, Kushan-Afrighid ceramics, comparable to those found at sites such as Toprak-kala and Kara-tepe, also appear, suggesting that cultural links with the eastern oasis continued in this period (Nerazik 1959; Nerazik 1976: 57).[16]

Turpak kala 1

Turpak kala 1 is the best preserved and most extensive settlement in Khorezm dated to the 4th to 5th centuries CE (Nerazik 1976: 7). It is located along a natural canal, close to Kunye Uaz. The settlement consists of at least 15 mounds situated along the banks of the canal, covering an area of

[16] Kushan-Afrighid ceramics were first identified at Kunye Uaz by Nerazik (1959). They have since been identified at several other sites in the western oasis, including at Chash tepe and Turpak kala 1 (Nerazik 1976), and at sites in the eastern oasis, at Toprak kala (Nerazik & Rapoport 1981), Kara-tepe (Brite et al. 2017a), the upper levels of Duman kala, Eres kala, and Dinghildzhe (Nerazik 1976: 57), and sites in and around Berkut kala (Nerazik 1966).

roughly three square kilometers. Excavation of the mounds revealed unfortified houses with 10-15 rooms that ranged in size from 500-1000 square meters (Nerazik 1976: 48-49). The layouts of the houses appear to vary widely.

Traces of domestic activities such as gardens, vineyards, or fenced areas were not found near the house mounds, but rather were located in a single area on the far southwestern edge of the settlement. This may indicate that subsistence activities were organized at the community level. Ceramics from the settlement were identified as late Kushan (end of the 3rd century CE) and Kushan-Afrighid (4th-5th centuries CE); remains of pottery kilns and slag suggest these may have been locally produced. While Nerazik (1976: 19) proposed that Turpak kala 1 was settled by migrating groups from the Syr Darya delta, the abundance of locally manufactured ceramics with stylistic parallels in the eastern oasis suggests instead stronger ties to this neighboring sub-region.

Kanga Kala

Kanga kala is a large (4.5 ha), fortified site located at the southwestern edge of the Prisarykamysh delta, near where the Uzboi River diverged from the channels of the western oasis (Tolstov 1958: 1962). The site has a notably long habitation sequence, ranging from the middle of the first millennium BCE to the 4th century CE. In its uppermost levels, Tolstov (1962: 231) discovered a room with a ritual deposit of 15 human skulls arranged around a hearth. Craniometric studies are believed to indicate these were the remains of an eastern Central Asian racial group.[17,18] The site, and specifically the osteological evidence from this deposit, has been central to the argument for an influx of eastern nomads into Khorezm in this period.[19] The deposit is dated based on associated ceramics to the 3rd or 4th century CE.

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[17] The skulls from Kanga kala are also reported to have had traces of skull deformation, though Tolstov (1962) does not provide any further description of this.

[18] The analysis of cultural origins based on racial classifications derived from craniometric measurements was, and still is, a common practice in Russian archaeology. The reliability of such methods is continually debated (see for example Ousley et al. 2009).

[19] A similar ritual deposit was also discovered at Kunye Uaz, however in that case the remains were placed in ossuaries. It is dated to the 3rd or 4th centuries CE (Tolstov 1962: 231; Nerazik 1958).

Conclusion

Our understanding of the culture changes that took place in Khorezm in the 3rd to 6th centuries CE is greatly obscured by a limited archaeological record and a complicated history of human-environment interactions. A clearer picture of environmental change in this period has recently emerged thanks to new scientific studies of the geologic history of the Aral Sea, which highlight major changes in geomorphology, climate, and the resource landscape. These changes undoubtedly impacted local populations in significant ways. If nothing else, the sparse archaeological remains of Khorezm's dark age document that inhabitants responded to these new circumstances through profound changes in their way of life.

The heterogeneity of settlement arrangements both within and among the different deltas suggests that the 3rd to 6th centuries CE was a time of significant reappraisal about how the variable resources of Khorezm could best be utilized to meet the needs of local populations. In the eastern oasis, some appear to have attempted to continue on much as before, albeit in a much reduced and less stable form, while others made adjustments in their agricultural regimes and community relations. In the northern and western oases, migration may indeed have been an important influx and an adaptive strategy that drove culture change, though a wide diversity of possible alterations in patterns of mobility, animal husbandry, and wild resource exploitation should not be underestimated or assumed. These complex reconfigurations of the settlement landscape eventually converged in early medieval times, producing a new system of social relations in Khorezm among feudal agriculturalists in the eastern oasis (the Afrighid) and semi-nomadic pastoralists in the Aral delta (the Kerder). The exact pathways to these cultural developments, for the present, remain unclear.

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Pl. 1. Sites of the Khorezm oasis, 3rd to 6th centuries CE.

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OSL DATING OF SUBMERGED ANCIENT JAREH BRIDGE-DAM (SOUTH-WEST OF IRAN)

BY

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Abstract: The aim of this paper is to date, introduce and document the ancient Jareh bridge-dam which had remained intact for hundreds of years, and was submerged in 2015 due to the construction of a new, larger dam on the Zard River. It is a solid structure with a height of 19 meters and a length of more than 89 m. The width of this dam from one end to the other varies from 1 m to 10 m. The location of this bridge is appropriate in terms of the river's course according to the type of the land, materials and design of the base, body and calculation of resistance during the outbreak of water, which are fastened to the base strength with their rocks and masonry. This dam can be found 35 km northwest of the Ramhormoz township in Khuzestan province, Iran; and has been constructed in narrow valleys within the Zard River by stones and plaster. Two OSL samples were taken from this bridge in 2007. By employing the Minimum Age Model, the date of erection of the Jareh bridge-dam was estimated to be between 1420-2090 years ago, falling within the Sassanid period. The Jareh bridge-dam is one of the largest Sasanian bridge-dams in the Khuzestan province. This study provides an understanding of the performance, the structure, and the hydraulic mechanism of the Jareh bridge-dam, and also the role played by it as a deterrent against the outbreak of the Zard River.

Keywords: Iran; Sasanian; OSL Dating; Ancient Jareh Dam; Documentation Archaeological Site; Cultural Heritage

Introduction

The benefits of dams include expansion of farmland, power generation, and the development of water-related industries such as fisheries. However, one of the disadvantages of the building of the dams is the worldwide annihilation of natural and cultural heritage. Due to the construction of new, more advanced dams, the ancient sites have been flooded. Unfortunately, when new dams are constructed, archaeological and architectural studies are generally not undertaken to ascertain information about the

history of the local area (e.g., Ghilardi et al. 2015), furthermore, the documentation and protection of cultural heritage is only a minor concern. It has been suggested that there is a necessity for strategies and standardised protocols to be put in place for recording and protecting monuments and archaeological sites when planning alterations of hydraulic infrastructure (Marchetti et al. 2019). Undertaking a pre-flooding assessment of the dam's impact on cultural heritage and recording quantitative and multi-temporal data on archaeological sites before they are submerged is very important.

The main objectives of construction of the new Jareh Dam was to supply irrigation water for Ramhormoz Plain, control floods and generate hydropower energy. The purpose of this study was to collect all possible data and information, including field sampling, from the ancient Jareh bridge-dam and its surrounding structure before it was submerged and then analyze them.

A research project in the area of the Jareh Dam was conducted; following the methodical surveys, a section of the Jareh village precinct was explored with a goal of reconstructing historical and cultural monuments (Sharifi 2018). Other archaeological excavations have also been undertaken in the Ramhormoz plain in the Jareh region and seven trenches were excavated in seven sites (e.g., Sharifi 2007, 2009a; 2009b; 2018). Following the archaeological excavations in Jareh dam basin, several settlements mainly belonging to the prehistoric, historic, and Islamic eras were observed and recorded in the catchment area of the dam (Sharifi 2018). The architectural results suggested three residential phases. According to the architectural remains of the first phase of the occupation, establishments with a specific architecture and variety of designs and drawings of rubble stone and plaster mixture in this area represents a flourishing settlement in this area. The second phase of the occupation in this area consists of houses with a simple plan, composed of a rectangular chamber made of rubble stone and river cobblestone. It seems that in this era, habitation scope was limited, and the extent and complexity of the mentioned establishment has been reduced and has a local and rural form. The third cultural period of this area was nomadic and recent establishment of this section. Basically, with regard to what is specified in the field and local surveys and in excavations till now, is that establishment of settlements are mainly in the margin of the Zard River, and scattered residential remains seem to be in different places (Sharifi 2018).

According to relative chronology, Phase 1 and 2 belonged to the Sassanian era, and the third phase belongs to the Islamic period. The main question was to find out whether the ancient Jareh bridge-dam is a Sassanid bridge or whether it belonged to the Islamic period.

The aim of the present paper is to report and introduce the ancient Jareh bridge-dam and its surrounding areas and functions, explain the method that we used to determine the date of its construction using the Optically Stimulated Luminescence (OSL) dating method, and also to document this ancient bridge-dam which has been submerged in the meantime due to the construction of a new dam (2008-2015).

Study Area, Site Description, and Sampling: The location of the ancient Jareh Dam and the Geology and Geomorphology of the Jareh Plain

Ramhormoz is a town located in the East of the Khuzestan province, South-Western Iran (pl. 1). The Ramhormoz climate is warm. The Ramhormoz plain is a large syncline which has been filled by the river's sediment and deposits from flooding during the Triassic period. The most fertile soil of Ramhormoz includes the sedimentary sections on the banks of the Zard River, which covers the town of Ramhormoz and extends 5 km from either side of the river. This is where today the most cultivated fields and gardens are located, and thus many ancient sites have been built in this area (Alizadeh et al. 2014).

There are many rivers in the Khuzestan province. The Zard River is one of these rivers. The ancient Jareh dam, the new dam and the reservoir are located around 35 km North-East of Ramhormoz township. The Zard River spans 11 km in a North-Eastern direction from the Jareh dam (pl. 1a). The dam is located at around 31°26′42″ N (latitude) 49°42′30″ E (longitude). The new Jareh dam is built with earth fill with clay core and the dam height above foundation is 114 m; the dam crest length is 740 m; the dam crest width is 12 m; and the design head is 90 m. The ancient bridge-dam is submerged inside the reservoir of this dam as shown by the yellow pin in pl. 1b and pl. 1c. The distance between the ancient dam and the new dam is around 400 m (pl. 2a).

Next to this ancient bridge-dam is an abandoned village (pl. 2b). At a height of 33 m from the current bed of the river, a burial mound was documented in the wall of the mountain. A map showing the position of

the dam and photos of different parts of it before it was submerged is shown in pl. 2-10.

The lake bed of the dam is situated in the Eastern edge of the Haftgel anticline, which was cut by the Lohbari fault. The bottom layer of the reservoir of the dam is composed of Bakhtiari conglomerate-Gachsaran formations and Quaternary sediments. The Zard River flows on many formations, and the new Jareh dam is constructed on the Gachsaran formation (Neissi et al. 2019). From the village of Jareh in the outcrops of the Gachsaran formation, gypsum walls are seen at a height of 50-60 m on both sides of the river (pl. 3a). Several deep and long waterways also joined the river (pl. 3b). Due to the ability of the anhydride to dissolve, several sinkhole cavities are observed in the Gachsaran formation. The anhydride in this formation has increased by water absorption and has caused regional displacements which has given a special face to this formation in the region.

Architectural and Engineering Characteristics of the ancient Jareh Dam and its related water channels

The ancient Jareh bridge-dam has a height of 19 m and a length of more than 89 m (pl. 4-6). The width of this dam from one end to the other varies from 1 m to 10 m (pl. 4). The upper part of the bridge-dam is almost vertical, while the lower part has a slope of about around 45 degrees, which is clearly observable if someone looked at it from the south of the ancient dam (pl. 4). This type of construction of a bridge-dam indicates that the dam is trapezoidal and is a type of single-arched dam (pl. 5).

The use of a trapezoidal shape in the construction of the dam is to increase the resistance of the dam against the water pressure behind the dam. The sloping side in front of the dam (pl. 4) made the dam stronger and more resistant to overturning water pressure. Sloping also reduces the energy of overflowing water, and decreases destructive energy due to water pressure behind the dam. On the other hand, at the time of the overflow, it creates a special visual beauty by creating a waterfall.

The ancient bridge-dam was built on the natural bedrock, which is the type of the Bakhtiari conglomerate. The material used for the construction of the dam included sandstone and mortar. The top surface of the dam has been coated with stones (pl. 6). This confirms that the dam was made to be used as a bridge too. Sand stones were collected from the bed of the river.

A mixture of Sarouj and gypsum was used as the mortar to both bind sandstone and to counteract the side pressure of the water.

Sarouj is used in Iranian architecture as a traditional water-resistant mortar made of a mixture of limestone and clay a four-to-six ratio and kneaded for two days. Some blast furnace slags are then added to the mix in combination with cattail (Typha) fibers, straws, and eggs. They are then fixed and beaten using a wooden stick to ensure even mixing. Sarouj was used to glue stones, pebbles and rubble to each other. This mixture turned rock-hard once allowed to settle and harden. Once hardened, this locally crafted mixture turned into a hard rock-solid cliff-like wall. The mortar has been used to counteract the side pressure of the water.

According to our studies, the ancient Jareh bridge-dam was constructed in two phases in the dry season. In the first phase, a tunnel with a diameter of 1.6 m (160 cm) was drilled into the wall of the left-hand side of the valley (pl. 7). Then, a small barrier (the interim embankment) was constructed and the water was guided to the deviation tunnel; and by deviation of the water, the floor behind the small barrier was dried. In the second phase the floor behind the barrier was prepared and the main body of the dam was constructed using river stones and sarouj mortar. The sarouj mortar was coated on the wall in two stages. In the first stage, a main coating was made and then another thickening coat was applied to reinforce it (pl. 8). Each cover has a smooth surface and is uniform. There are grooves on it which have a toothed motif and these motifs are used to connect the newer coat to the previous coat. This also creates a resistant coating against corrosion and degradation by water and flood which increased the stability of the Jareh bridge-dam. The second coat was lost in the lower parts of the bridge-dam due to moisture but has remained on the upper part.

The external water channels have been designed to provide water to the agricultural lands beyond the dam (pl. 9). Depending on the topography of the area, either tunnels were constructed or these channels were built by excavating the high land. In some parts of the channel, due to the low topography of the area, the land was filled with river sand. These channels were built and could be easily observed on both sides of the dam. The remaining channels were observable to 2.5 km on the right and 4 km on the left of the bridge-dam. The left channel has been diverted over a bridge on the river, 3.5 km from the dam, to provide water for lands higher than the river bed on the right-hand side of the river. The remains of this diverted

channel could be seen in the valley, 6 km far from the Jareh bridge-dam. The system of operation of these channels was that after the water was raised behind the dam, these channels moved the water to the agricultural lands far away from the dam. At the start of the water guidance channel, a predicted lateral overflow is carried out to restore excess water (water more than what the channels were capable of handling according to their design) again to the river.

Sampling site of the Jareh Bridge-Dam

The sampling site is located in the river behind the dam (pl. 10). Two lake sedimentary sections on top of the old river bed sediments were investigated. The bottom of each lake section above the coarse gravel river bed sediments were sampled in 2007 using steel tubes (5 cm diameter, 25 cm length) that were rammed into freshly prepared vertical sections. To ensure no mixing during transport, the cylinders were fully filled with sediment. In order to prevent exposure to light or loss of moisture, black plastic sheets were placed on the tubes to cover them.

OSL Dating Methodology Basics

OSL dating is employed to determine the time of the last daylight exposure of the sediment grains. There are luminescence dosimeters such as quartz and feldspar in the sediment grains. Due to an event such as a flood, sediment grains can be exposed to sunlight. The light removes the OSL signal in the luminescence dosimeters acquired over geological time and their luminescence "clock" is set to zero. Once the sediment is buried, the luminescence clock in the OSL dosimeters restarts. The luminescence dosimeters in the sediment grains will be exposed to radiation from environmental sources. The radiation ionizes the atoms and separate electrons form the ions. As the time passes, the number of trapped electrons in the dosimeter traps increases. We collect buried sediment at dark and transfer them to the dark lab. Samples of buried OSL dosimeter grains release trapped electrons, as well as photons, once stimulated in the laboratory. We measure the artificially absorbed radiation dose that produce similar OSL signal as the level of OSL accumulated in the dosimeter during burial (the equivalent dose). We then calculate the burial age of grains by dividing the equivalent dose D_e (the radiation level responsible for

producing the luminescence signal) by the dose received per year (during burial):

Age (ka) = Equivalent dose, D_e (Gy)/Dose rate (Gy/ka)

Lake sediments

Although luminescence dating had been applied to widespread depositional environments, the use of luminescence dating to lake-floor sediments has been limited to few studies (Burrough & Thomas 2008; Armitage et al. 2015; Fattahi et al. 2014; Fattahi et al. 2015; Fattahi 2015; Long et al. 2012; 2015a; 2015b; Roberts et al. 2018; Torabi et al. 2020). Roberts et al. (2018) have mentioned different reasons for this limitation which include: the logistical difficulties of deep-drilling, possible collection of the sediments within transparent core-liners, possible changes of the water content of the sediments over time which affect the age determination (e.g. usually ~1% change in age for every 1% change in water content for a given sample). The last and the most important limitation is incomplete removal (or 'bleaching') of the pre-existing luminescence signal during transport and deposition. Incomplete signal resetting of the luminescence signal at deposition (partial bleaching) by daylight exposure may result in age overestimation and can be a problem in some lacustrine and fluvial settings (e.g. Long et al. 2015a; 2015b; Olley et al. 2004; Gemmell 1997; Murray et al. 1995; Stokes et al. 2001).

Partial bleaching

Within lacustrine environments, prior to deposition, the luminescence signal may be partially bleached (zeroed) due to various factors such as the reduced penetration of light through the water column which can be enhanced by increased suspended sediment concentrations. The bedload and water depth, as well as the method of sediment suspension, are also variables that may cause bleaching of lacustrine sediments. Reduced light penetration through the water column reduces bleaching efficacy, thus the amount of time of light exposure needed to reset the luminescence signal is increased. The amount of bleaching is variable depending on the local conditions within a given site, including factors such as transport distances and processes, and the turbidity and depth of the water column. In the event of incomplete bleaching, the time elapsed since deposition would be overestimated.

Different proposals have been put forward to overcome this partial bleaching problem for calculating age. One such proposal takes advantage of the multi-faceted nature of the quartz OSL signal, by isolating and dating the OSL traps that are the most light-sensitive (e.g., Tsukamoto et al. 2003; Jain et al. 2005; Li & Li 2006). Comparing the ages of multiple signals that have different bleaching rates has proven successful in identifying well-bleached quartz (Murray et al. 2012; Reimann et al. 2015). An alternative approach, using inter-comparison of K-feldspar and quartz ages, has been shown to be successful in assessing pre-depositional bleaching (e.g., Long et al. 2019).

In the last twenty years, most of the poor bleaching studies have concentrated on evaluating scatter within dose distributions. These group of methods utilizes smaller aliquot sizes (Olley et al. 1998), or single-grain dating techniques (Duller et al. 1999; Duller 2008; Fattahi 2015).

Small-aliquot (less than 100 grains) and single-grain dating may allow the true burial age of a sample to be isolated by allowing the population of grains not bleached at deposition to be identified. Olley et al. (1998) used the mean of the lowest x% of the D_e values in the D_e distributions (where they calibrated x to be equal to 5 for their sediments); Single grain or small aliquot results commonly show positively skewed D_e distributions, with the youngest population representing the grains fully bleached at deposition. Currently statistical analysis of single-aliquot (or single-grain) based dose distributions is most commonly applied to evaluate the bleaching level of sediments (e.g., Wallinga 2002; Bailey & Arnold 2006); this method is applicable to young sediments (< 10 ka) where partial bleaching dominates over-dispersion.

Different statistical techniques have been used to separate well bleached grains which represent a true burial dose. For bleached samples one of the mean calculation methods such as the weighted mean or central age model (CAM) is commonly used. To estimate the number of dose components within a dose distribution and the corresponding D_e for each component the Finite mixture model (FMM e.g., Roberts et al. 2000) can be used. The youngest cluster of D_es can be identified by the lowest component. If samples contain a mixture of grains with different bleaching histories, the minimum age model (MAM e.g., Galbraith et al. 1999) can be employed to identify the fully bleached grains which provide the minimum age (e.g., Wallinga 2002; Fattahi et al. 2016).

Experimental treatment

The samples were processed under subdued red light. The sediments at both ends of the tubes were extracted, and the sediment remaining was used for equivalent dose determination. The 90-250 μm size fractions were sieved and chemically treated by 10% HCl to remove carbonate, and immersed for two days in 30% H_2O_2 to remove any organic material. Quartz (2.62-2.70 g/cm^3) fractions were separated using sodium polytungstate and etched with 40% HF for 60 min (followed by an HCl rinse).

The purity of the quartz extracts was checked by the OSL IR depletion ratio (Duller 2003) and revealed almost no feldspar contamination for both S1 and S2 samples. The dried quartz was then sieved further using 90 μm and then 212 μm sieves.

Small aliquots (90-212) μm were mounted on 10-mm-diameter aluminium discs using silicone oil for the small (2mm) single-aliquot analyses. A Risø (Model TL/OSL-DA-15) automated TL/OSL system equipped with a built-in beta source calibrated (to provide a known dose rate to quartz: 4.7 Gy/min), and ~470 nm and ~870 nm light emitting diodes (for stimulation of quartz and feldspar grains) in the Oxford luminescence lab was used for all the experiments reported here. A 7.5-mm-thick Hoya U-340 filter was used for Quartz OSL detection.

For D_e determination the Single Aliquot Regenerative (SAR) method (Murray & Wintle 2000; Wintle & Murray 2006) was employed. The luminescence characteristics such as thermal transfer and dose sensitivity, was examined using thorough quality control procedures on the SAR data and via dose recovery tests.

To choose suitable thermal treatments, and to assess the performance of the SAR protocol for our samples, a dose recovery preheat-plateau test for both S1 and S2 samples were carried out (Table 1, pl. 12, pl. 13). For each preheat temperature, three aliquots of each sample were used. After depleting the natural signal with daylight for 2 days, each aliquot was given 5 Gy beta doses in the luminescence reader with the internal beta-source. The preheat ranged from 200 °C to 300 °C with 20 °C increases, while the cutheat temperature was fixed at 160 °C. The results are shown in tables 2 and 3. For both samples the dose recovery ratio was independent of the preheat temperatures (within 10% of unity); the recuperation value and recycling ratio for both samples were acceptable.

Table 1: Applied single-aliquot regenerated sequence.

Step	Treatment	Observed
1	Give dose	–
2	Pre-heat at 200-300 ºC for 60 s	–
3	OSL measurement at 125 ºC	Lx
4	Give test dose	–
5	Cut- heat at 160 ºC for 60 s	–
6	OSL measurement at 125 ºC	Tx
7	OSL bleaching at 280 ºC	Tx
8	Return to 1	–

The first 2 s of the stimulation curve were integrated as signals, after subtracting the background signal derived from the subsequent 2-8 s integral to reduce contamination from the medium and slow components. Dose response data were fitted to an exponential function. Aliquots with signal >3 sigma above background, recycling ratio between 0.90 and 1.10, test dose error <15% and recuperation signal <5%, were selected for D_e determination. As the aliquots that were used passed the basic assumptions of SAR method, the D_e obtained using this method, for quartz can be considered robust and reliable.

Dosimetry

Dose-rates for each sample were calculated using radioisotope concentrations, burial depth and present-day moisture content. Uranium, thorium and potassium concentrations were measured using ICP (Table 2). Present-day moisture contents were determined by drying at 40 °C in the laboratory. Alpha, beta and gamma dose rates were calculated from radioisotope and water contents using the conversion factors of Adamiec & Aitken (1998) and Aitken (1985) respectively. Secular equilibrium in the uranium decay series was assumed. Alpha and beta dose rates were corrected for attenuation due to grain size using the factors of Bell (1980) and Mejdahl (1979). An alpha efficiency of 0.04 ± 0.02 was assumed for both samples. Cosmic ray dose rates were calculated from burial depth, altitude, and overburden density (1.85 g/cm^3) using the formula given by Prescott & Hutton (1988).

Table 2: Dose rates based on analysis of sediment by ICP-MS.

Sample ID	Depth (m)	±	Water (%)	±	K (%)	±	U (ppm)	±	Th (ppm)	±	Cosmic (Gy/ka)	±
S1	0.5	0.1	5	2	0.82	0.04	1.49	0.07	3.40	0.17	0.20	0.14
S2	6.4	0.1	5	2	0.75	0.04	1.78	0.09	2.90	0.15	0.10	0.14

Age of Dam-Bridge

The small (2 mm) single-aliquot D_e distribution of Quartz grains of samples S1 and S2 are shown in pl. 11. The equivalent dose values of the both S1 and S2 sediments have widespread distribution (pl. 11), usually referred to as 'overdispersion', observed between the true D_e values of aliquots from the same sample. When more than 5% of D_e values lie outside $\pm 2\sigma$ of the central value, the dose distribution is termed over dispersed. Overdispersion (OD) is a quantitative estimate of the amount of spread in the D_e data set after allowance has been made for measurement uncertainties (Galbraith et al. 1999; Roberts et al. 2000; Galbraith et al. 2005). Although microdosimetry and post-depositional mixing may contribute to D_e scatter for these lacustrine samples, high overdispersion values (e.g., >90% and 87 for S1 and S2, respectively) are primarily due to partial bleaching.

Model selection for D_e determination

The samples include grains from different time scales. Only some of these grains have been exposed to light, long enough to reset their luminescence signal. The aim is to separate the D_e of these well bleached grains using a suitable model. The choice of model, e.g. the mean, the weighted mean, the probability plot, common age, CAM, MAM or FMM, is based on different parameters including the OD value (Galbraith et al. 1999).

Table 3: Quartz OSL ages using MAM Age Model.

Sample ID	D_e (Gy)	±	Total (Gy/ka)	±	Age (ka)	±
S1 (Min age)	2.70	0.51	1.56	0.14	1.73	0.36
S2 (Min age)	2.5	0.41	1.42	0.14	1.76	0.34

In order to consider which age model is more suitable for our samples, the age model decision process by Arnold et al. (2007) and Bateman et al. (2007) was also used. Specific D_e distribution characteristics (e.g., over-dispersion, skewness) were taken to identify the appropriate statistical approach. These age model decision processes suggested the use of either lowest 5% or MAM for both samples. We employed MAM for calculating the construction time of this dam-bridge (pl. 11, pl. 15 and Table 3). Furthermore, for comparison, the D_es and ages of the weighted mean, the probability plot, and CAM is presented in pl. 14 and Table 4.

Table 4: Quartz OSL ages using a different Age Models.

Sample ID	D_e (Gy)	±	Total (Gy/ka)	±	Age (ka)	±
S1 (Mean (SE)	13.94	1.88	1.56	0.14	9.0	1.5
S2 (Mean (SE)	10.48	2.25	1.42	0.14	7.4	1.7
S1 (weighted mean)	7.61	7.72	1.56	0.14	4.9	5.0
S2 (weighted mean)	3.38	3.63	1.42	0.14	2.4	2.6
S1 (CAM)	11.04	1.73	1.56	0.14	7.1	1.3
S2 (CAM)	7.95	1.47	1.42	0.14	5.6	1.2
S1 (Min age)	2.70	0.51	1.56	0.14	1.73	0.36
S2 (Min age)	2.5	0.41	1.42	0.14	1.76	0.34

D_e and age result

As only a minority of grains are fully bleached, only the smallest D_es chosen by MAM model was employed for age determination of S1 and S2 samples. MAM OSL dating thus gives the construction ages of the bridge at 1.73 ± 0.36 and 1.76 ± 0.34 ka, suggesting that the bridge was constructed between 1370-2100 years ago (overlap between 1420-2090 years).

Discussion

Although accurately quantifying the time of construction seems complicated, this age range (1370-2100 years) is reliable and include almost all the associated age uncertainty. The upper limit of the estimated age of

1370-2100 years ago achieved by the MAM OSL method may still overestimate the time of construction. Even when the minimum age model is applied, the ages of each single aliquot are still an average signal of many grains ranging from unbleached to fully bleached grains. If the number of fully bleached grain in the aliquots is limited, the calculated ages can overestimate the true probable age. The samples have been collected from the bottom of the reservoir deposit, upstream from the dam. The date of the samples provides the time the dam was in use. In other word, it post-dates the time the dam was built.

However, this age range (1370-2100 years) is historically consistent with the Sassanid and Parthian period. The Sassanid period ran from 224 to 651 AD (427 years) or 1368-1795 years ago. The Parthians ruled from 247 BC to 224 AD. Archaeological and historical information in addition to this age suggests that the ancient bridge of Jareh, was built in the Shapur I Kingdom period and or after the battle between the Shapur I and Valerian, as explained below.

Shapur I (the first) also known as Shapur the Great, was the son of Ardashir, the founder of the Sasanian dynasty. He was the second shahanshah (king of kings) of the Sasanian Empire. Shapur I (240-270 AD) successfully crossed the Euphrates River in the battle of Edessa in 260 AD, and seized the city Antioch. The Roman Emperor Valerian went to liberate Antioch and took the city back, but then Shapur I strategically entrapped the Romans. Although the Romans tried to escape, they failed and the Roman Emperor was captured (Ball 2016). Consequently, Shapur I won the war with Valerian. This victory is one of his most notable victories (Dignas & Winter 2007). The defeated Valerian army, which consisted of seventy thousand soldiers, were captured by the Sasanians. Shapur I used these captives for civilian activities in Iran (Ball 2016: 23). Among these captives, there were a lot of engineers and architects who were employed for technical and engineering activities in the Fars and Khuzestan provinces (Dignas & Winter 2007). In addition to numerous historical sources, the wars between the Romans and Sassanids were also discussed in the inscription of the Ka'ba-ey Zartosht. Tabari (1.827) specifically mentions Roman prisoners of war being involved in the dam construction. But it seems doubtful that Sasanian Persia relied exclusively on captured Romans to build its dams and bridges.

The different methods the Sassanids used to construct various buildings, especially dams, lead the dams of this period to be built with a mixture of

both Persian and Roman techniques and style. This resulted in the construction of the Sassanid bridge and dams on the Dez, Karkheh, Karun and other rivers in Iran by the Roman captives (Howard-Johnston 2006: 201; Adams 1962). Among them, the most notable are the Mizan dam (pl. 17) (Potts 2012), the Shushtar bridge, the Shadorvan dam (pl. 16) (Huff 2010: 1083; Potts 2012), the Dezful bridge and the Gampou dam in Larestan of Fars province (Malekzadeh 2013). However, there is no reason to believe that all Sasanian mortar structures date to the lifetime of the cited prisoners of war. Surely, Sasanian architects were quite capable of building such monuments without Roman help. The bridge/dam at Gondeshapur is thought to postdate this era (see Huff 2010 with references). Although little is known about this monument, there was also a bridge built with a mortar structure on the Ghilghilchay Wall (Tsetskhladze 2006: 173) that is much later. It is important to mention that none of these dams has been dated by an absolute dating method. Admittedly, most Sasanian bridges and dams are not well dated – which is why this study is an important contribution. Note, of course, also that the OSL dating allows for the Jareh bridge-dam to be later than Shapur I (or theoretically earlier).

The Jareh bridge dam material and structure is somehow different to many other dams such as the ancient Gampoo dam; the ancient dams of Bahman, Amir, Mizan and Band-e Kaisar. While the Jareh dam is only made of sandstone and mortar, the other dams are made by bricks or combination of sandstone and bricks. However, most of them have been used as both dams and bridges. Their dual-purpose design exerted a great influence on Iranian civil engineering and was instrumental importance for developing Sassanid water management techniques. The integration of a dam structure into a bridge design became a standard practice of Iranian hydraulic engineering during and after the Sasanian period (Smith 1972: 56-61).

Conclusion

Due to planning alterations of the hydraulic infrastructure, we undertook a pre-flooding assessment of the new Jareh dam's impact on cultural heritage and recorded quantitative and multi-temporal data on archaeological sites before they are submerged. The archaeological excavations in the Jareh Dam basin indicated 3 residential phases. Phases 1 and 2 belong to the Sassanid era and the third phase belongs to the Islamic period. OSL

dating ages (1370-2100 years ago) suggest that the ancient Jareh bridge dam was built during the Sassanid period. In fact, the Sasanians, after the formation of a powerful central government, made a lot of progress in the construction of dams and gates, of which the Jareh bridge is one of them; in order to meet the needs of residents in the field of irrigation and water supply, and also for the purpose of commuting residents of the area.

The Jareh bridge was originally a solid structure with a height of 19 m and a length of more than 89 m during the Sassanid period, but nowadays it has been submerged. The width of this dam from one end to the other varies from 1 m to 10 m. The location of this bridge is appropriate in terms of the river's course according to type of land, materials and design of the base, body and calculation of resistance during the outbreak of water, which are fastened to the base strength with their rocks and masonry. For the construction of this bridge, durable materials were used that have remained for perhaps as long as 1700 years. The channels connected to the dam were used to supply water to agricultural land in the area.

In addition to controlling surface waters, it had been used throughout the years as a bridge over the river which facilitated the passage of the inhabitants. The structure is also designed to prevent erosion to the valley, thus preventing any new water routes budding off from the main path. This structure has led to a rich supply of water channels to the surrounding land, which demonstrates the accuracy of the hydraulic engineering and natural irrigation systems in use during the Sasanid period.

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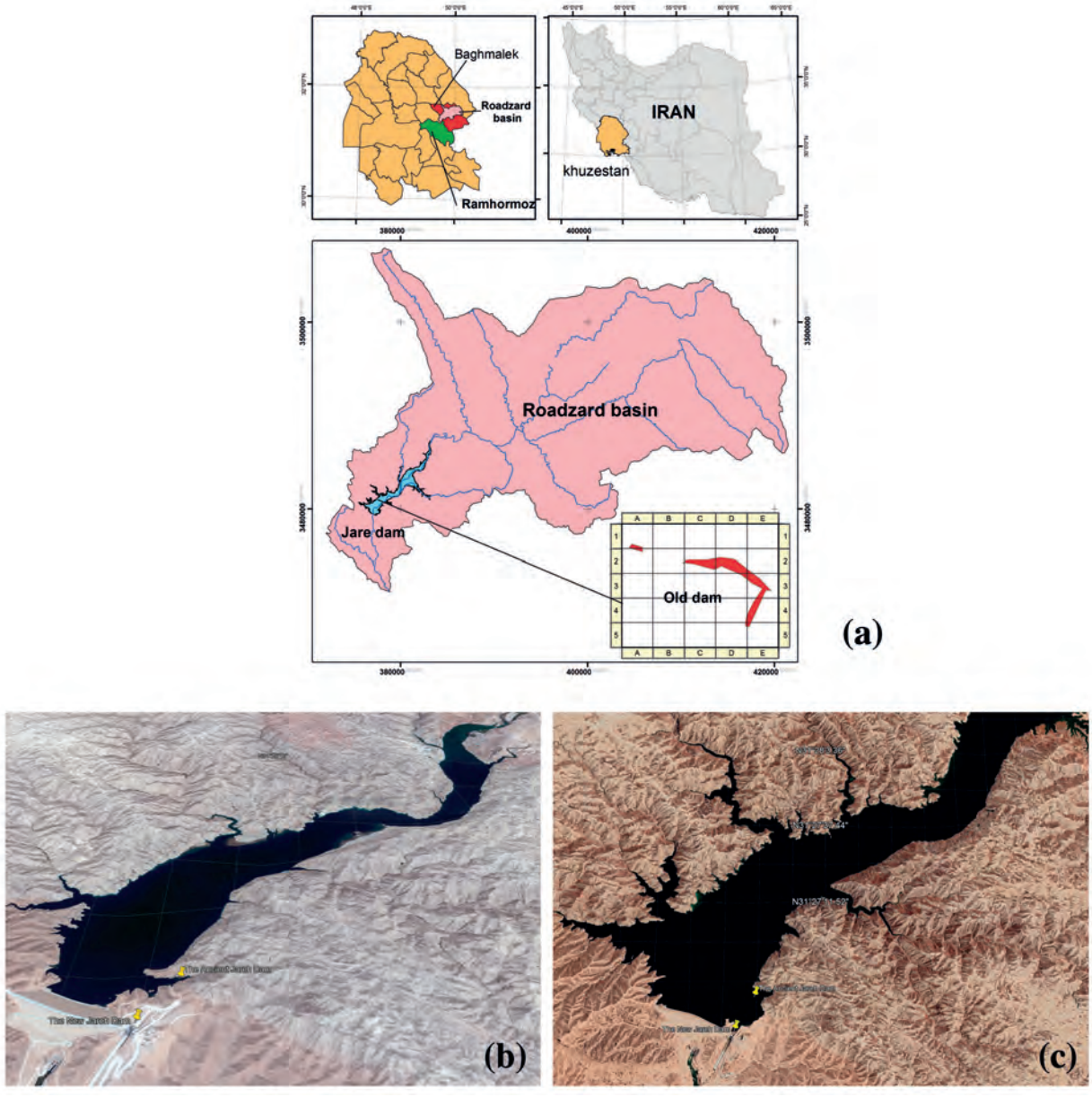
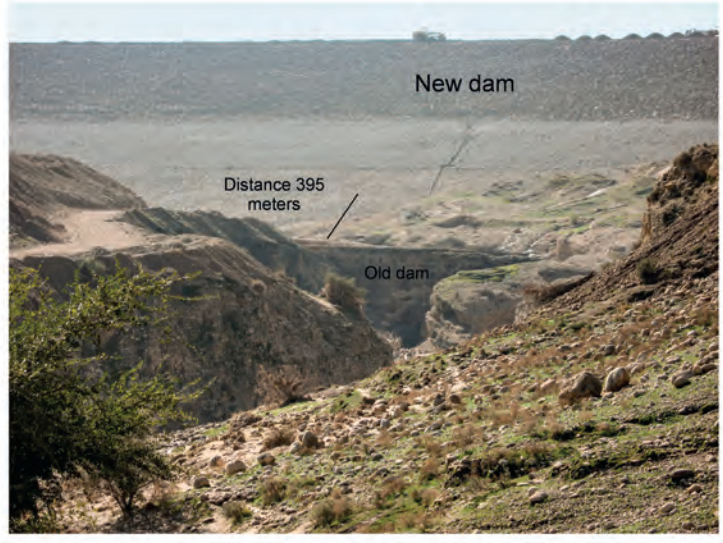
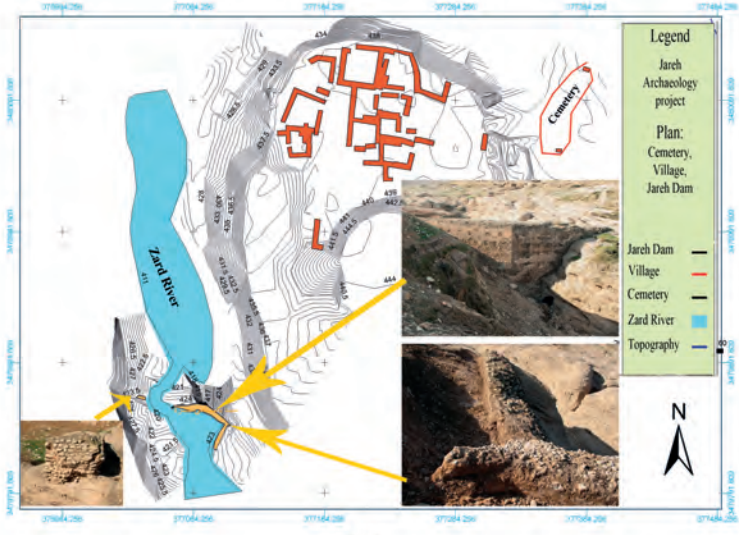


Pl. 1. (a) Top right shows the map of Iran. The yellow part in south west of Iran Map and also the picture top left show Khuzestan province. Ramhormoz is a town located in East of the Khuzestan province. The Jareh dam is located 35 km North-West of Ramhormoz and along the Zard River (UTM: 39R0377264-3480342) in Roadzard basin. Google earth image taken 2011 (b) and 2019 (c).



(a)



(b)

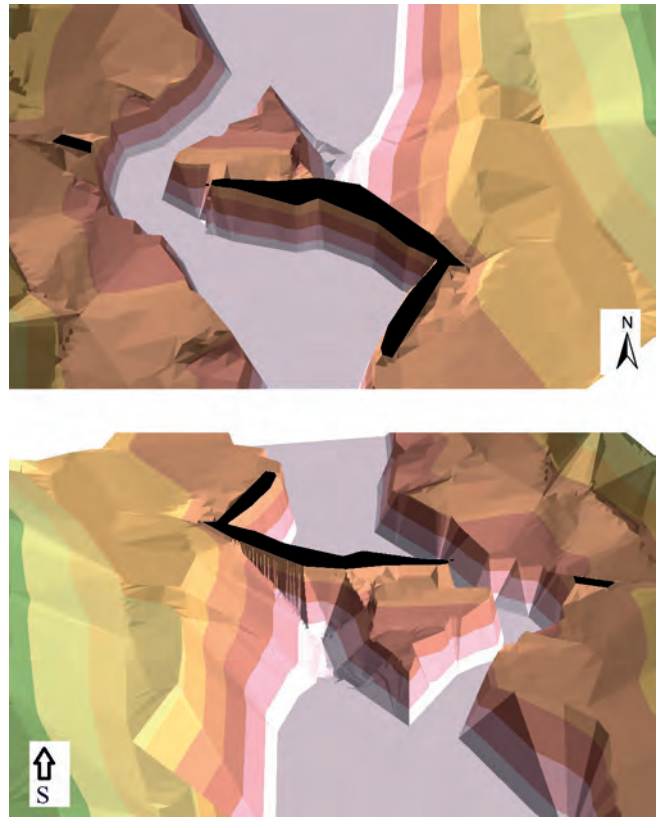
(c)

Pl. 2. (a) View over the ancient and new Jareh Dam from north west to south. (b) Sketch of the river and the ancient Jareh Dam and the abandoned village. (c) View over the ancient and new Jareh Dam from northwest to southeast.

Pl. 3. (a) The Gachsaran formation, gypsum walls are seen at a height of 50-60 m on both sides of the river.

(b) Examples of Deep waterways.

Pl. 4. North and South of Jareh dam.

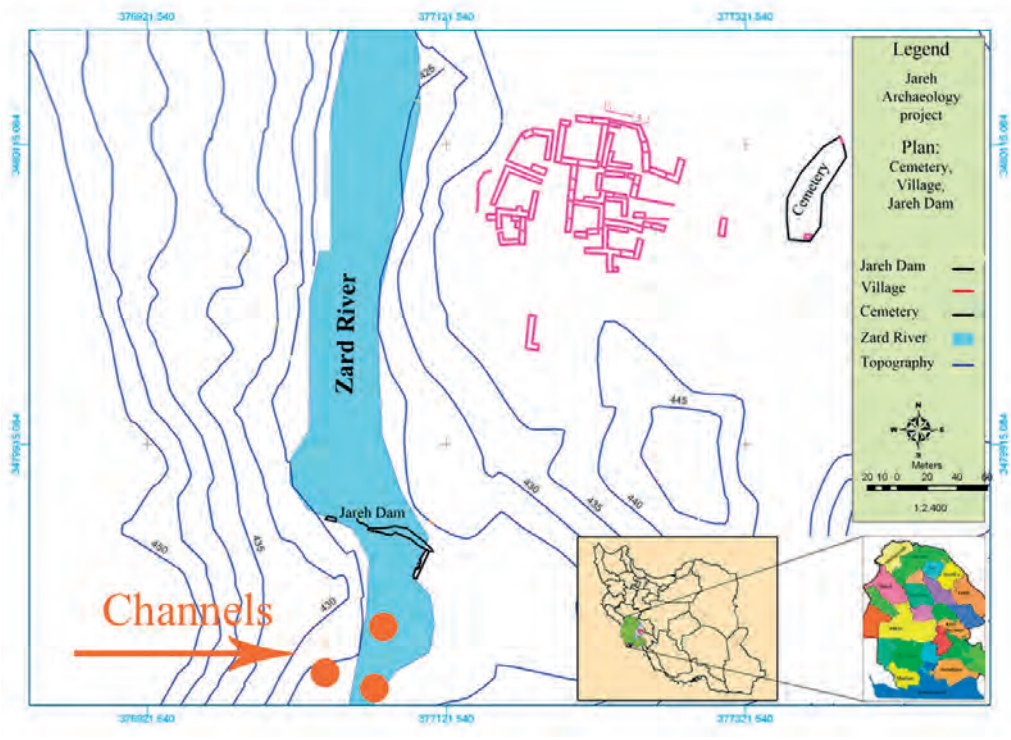


Pl. 5. Sketch of the ancient Jareh dam from south to north.

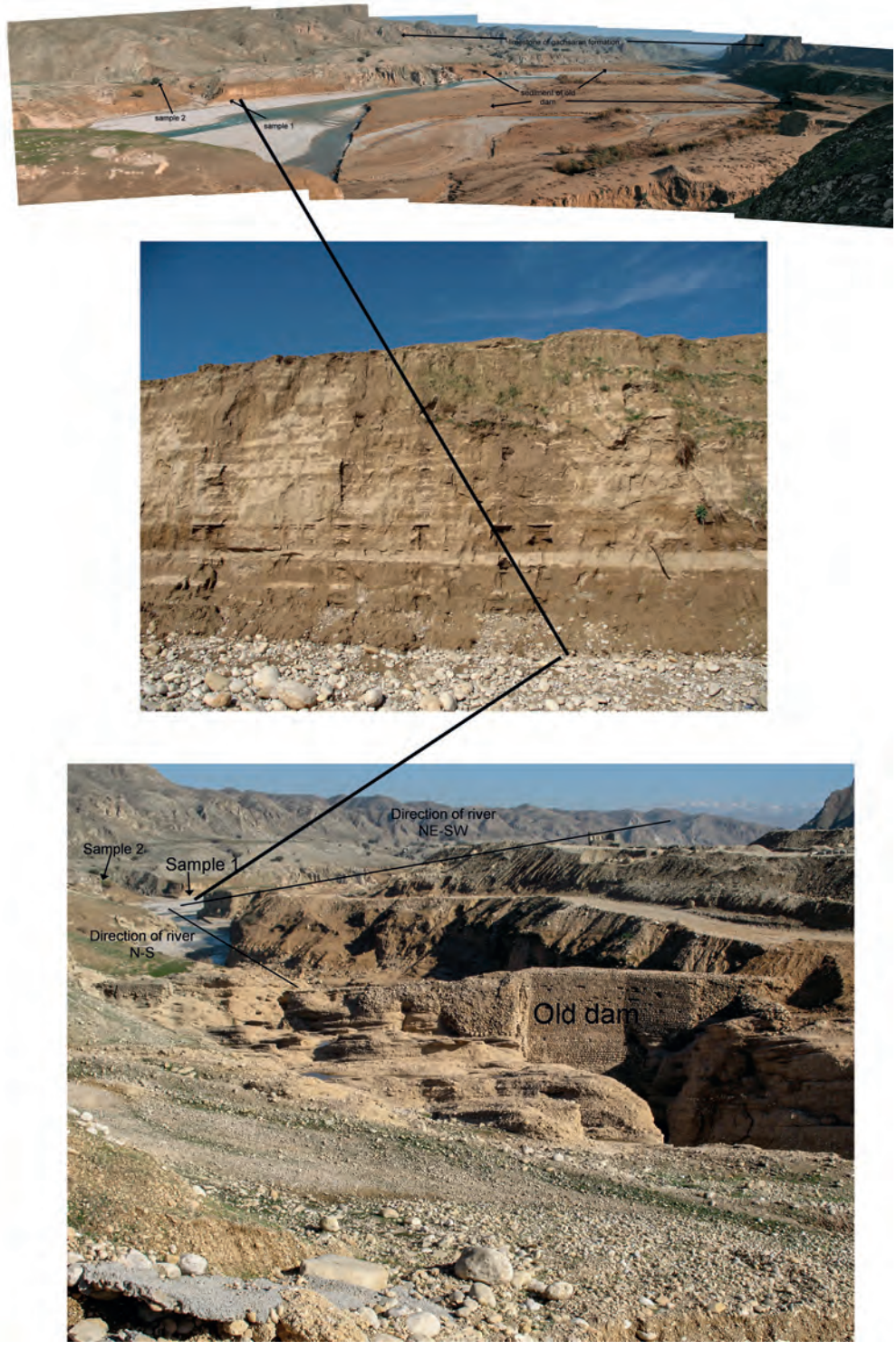
Pl. 6. Top of the ancient Jareh bridge dam and overall view of Jareh.

Pl. 7. A tunnel with a diameter of 1.6 m (160 cm) was drilled into the wall of the left-hand side of the valley.

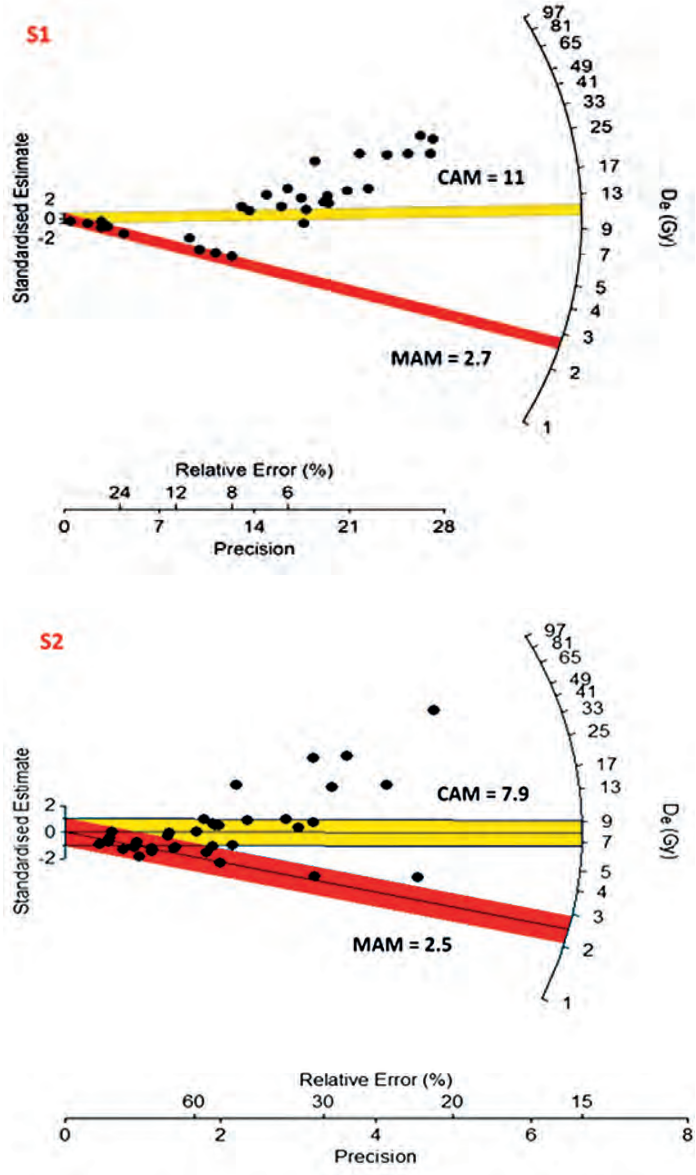
Pl. 8. The Sarouj mortar coated on the wall of the Jareh bridge-dam.



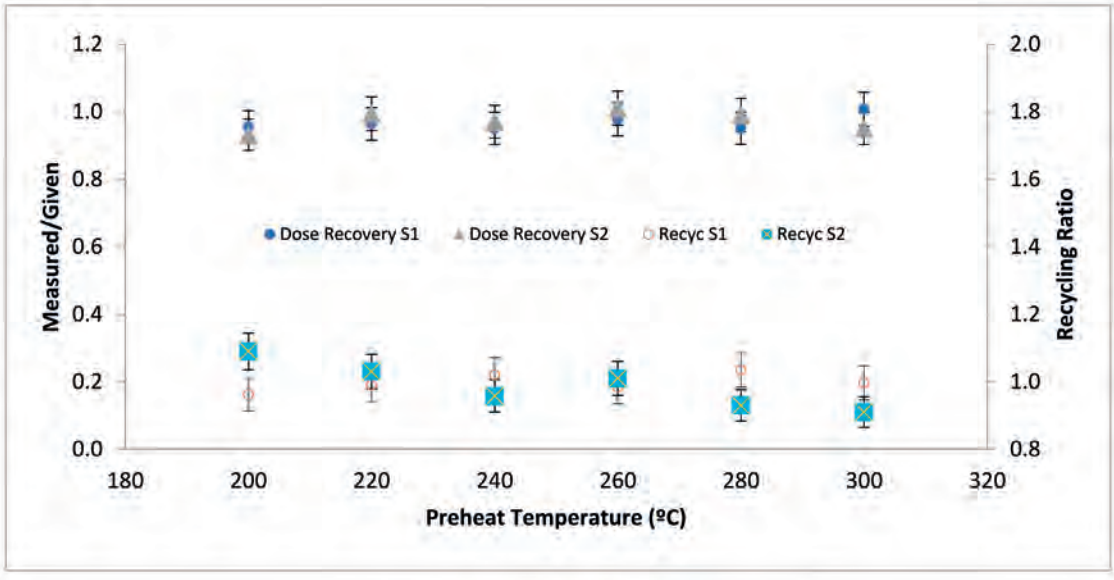
Pl. 9. The position of channels.



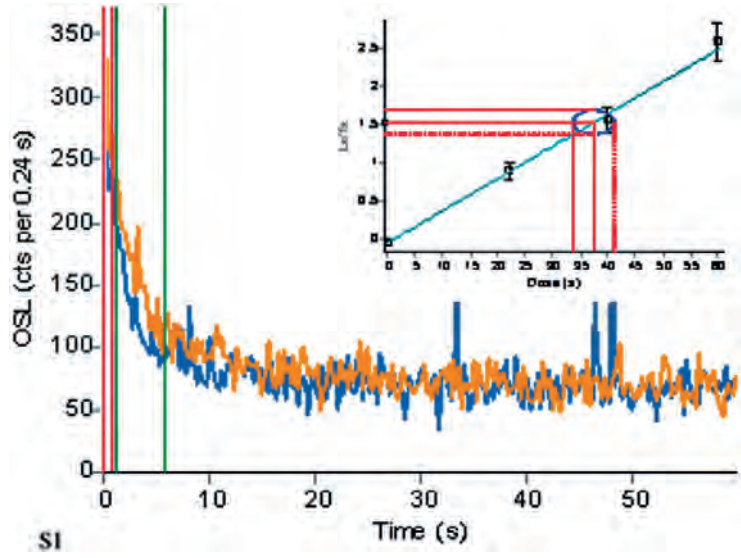
Pl. 10. The sampling sites.

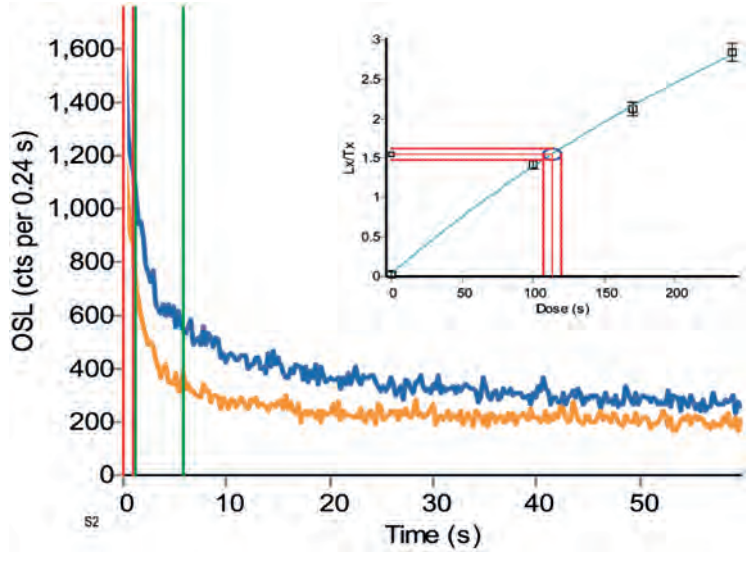


Pl. 11. The D_e value of lake bed sediments, representative radial plots of 'mixed and scattered' small single-aliquot D_e distributions from samples S1 and S2. The yellow bands show values of 1 (for S1) and 2 (for S2) standard deviations from the D_e CAM estimates centered on the reference value (Galbraith et al. 1999). The red bands show values of 1 (for S1) and 2 (for S2) standard deviations from the D_e MAM estimates centered on the reference value. The solid black lines in the middle of the red bands show the MAM D_e, and interpreted as representing totally bleached grains, which were used for sample D_e and age determination.

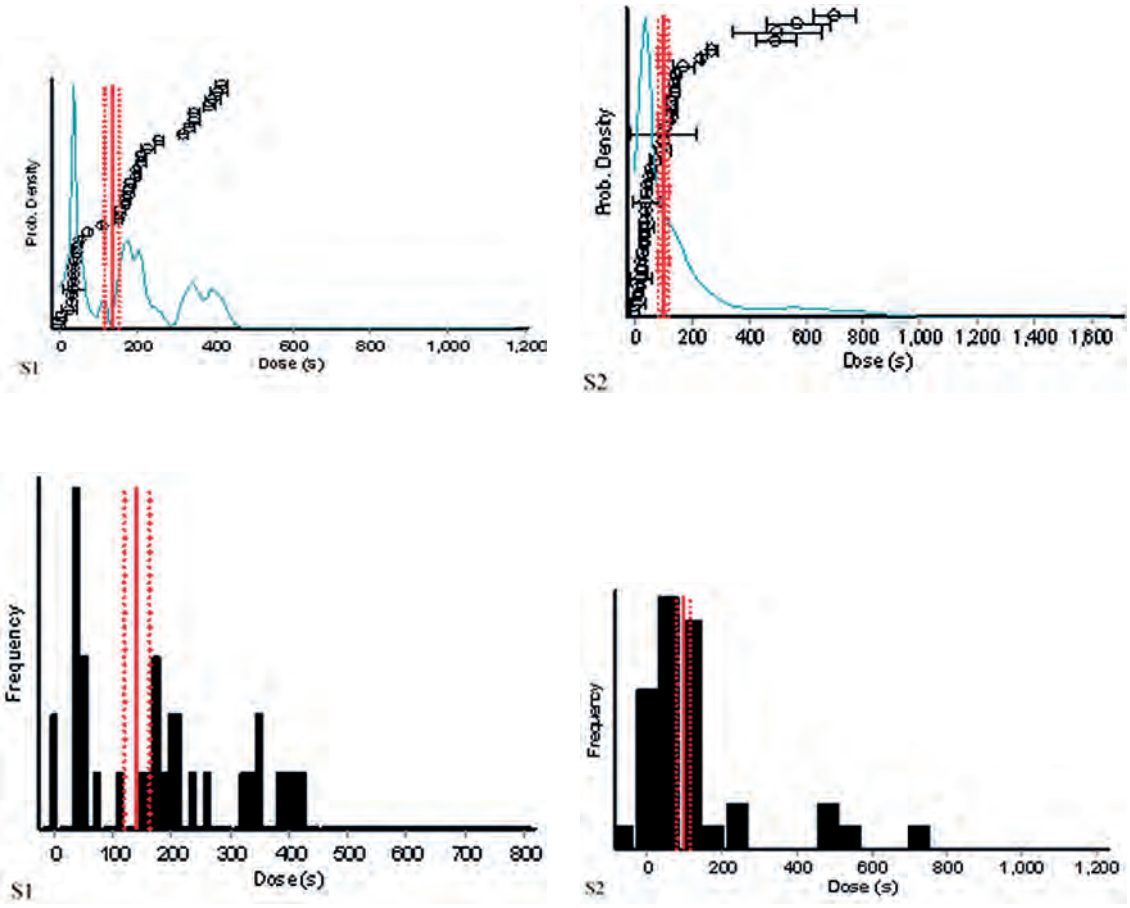


Pl. 12. Dose recovery and recycling ratio rates (pre-heat plateau test). Dose recovery preheat plateau for samples S1 and S2 using a fixed cut-heat at 160 °C. After eroding the natural signal using daylight for 2 days at room temperature, a laboratory dose of 5 Gy was given to the sample. This dose was then treated as a natural dose, and the D_e was determined using a range of regenerated doses from 3-15 Gy and a test dose of 3 Gy. The average D_e of three aliquots for each preheat temperature is plotted versus preheat temperature for 10 s using heating rate of 5 °C/s and uncertainties represent one standard error.

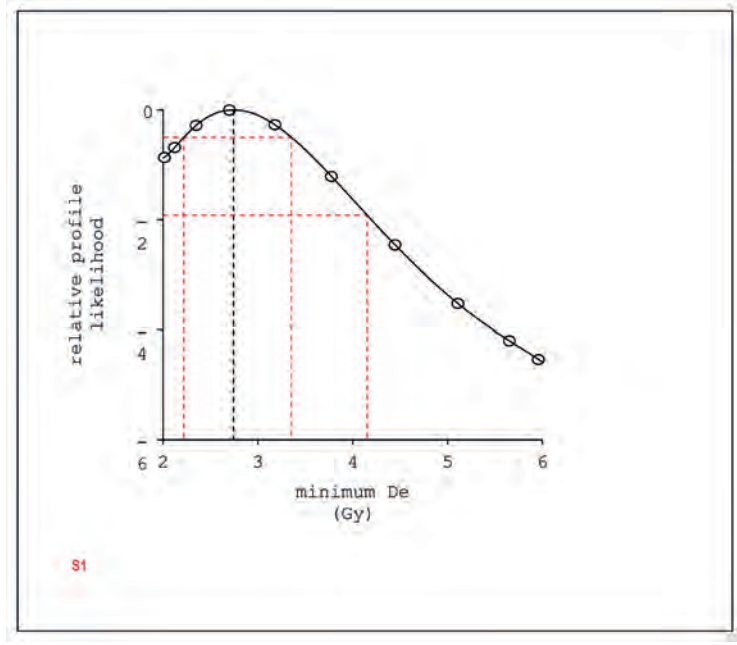


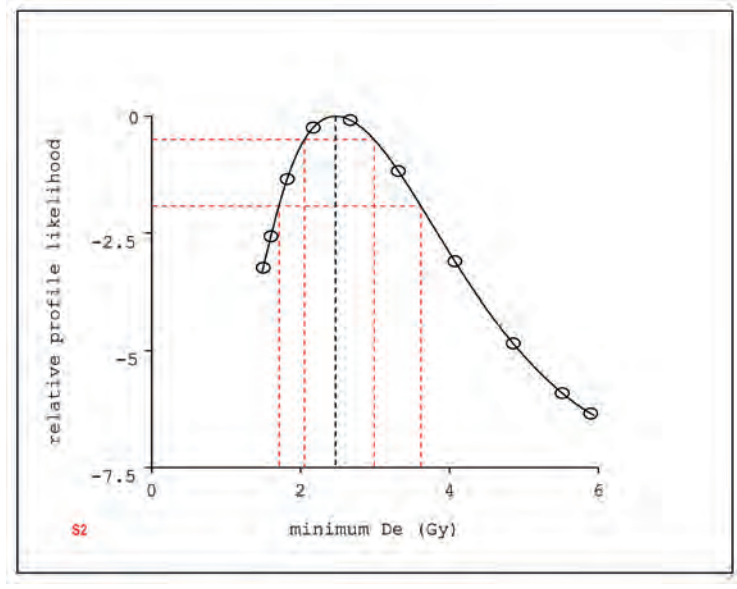


Pl. 13. Decay curve at 125 °C, and dose-response curve of Quartz single aliquots of samples S1 and S2.



Pl. 14. D_e distribution of Quartz single aliquots of samples S1 and S2.





Pl. 15. The relative profile likelihood graphs for quartz single aliquots of samples S1 and S2. The Minimum age model was applied using the program kindly provided by Sebastian Huot.

Pl. 16. Photo of Shadorvan dam.

Pl. 17. Photo of Mizan dam.

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THE COBBLESTONE ROAD OF MIRORAH: EVIDENCE FROM THE LATE SASSANID AND EARLY ISLAMIC CENTURIES' ROAD-BUILDING IN WESTERN IRAN (LURISTĀN PROVINCE)

BY

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Abstract: In 2017, an archaeological survey was conducted in the south of Luristān province in western Iran, where the remains of a previously undocumented cobblestone road were discovered. Preliminary surveys revealed that the cobblestone road was part of an ancient communication road that connected Susiana to western Iran. The purpose of this article is to introduce this cobblestone road and demonstrate the importance and necessity of road construction in such a mountainous region. The date of its construction is argued by investigating the archaeological evidence and reports from historical texts. Architectural evidence and ceramics scattered on the surface of small structures along the cobblestone road and surveying the landscape of the area indicate that this cobblestone road was constructed during the Sassanid era and was also used in the early Islamic centuries.

Keywords: Iran; Luristān province; Sassanid; Cobblestone Road; Mirorah

Introduction

Luristān province is located in western Iran and in the cultural zone of the central Zagros (Fig. 1). Luristān was an important crossroad of communication routes from the prehistory up to the present day (Hendrickson 1985: 7-10). Archaeological evidence, including bridges, caravanserais and cobblestone roads, identify this region as a crossroad between Susiana and the western part of the Iranian Plateau. In the Sassanid period and the early Islamic centuries, the road from the northern cities of Khuzestan [Susiana] such as Shush, Eyvan-e Karkheh and Jundi Shapūr to the west of Iran crossed the area. The results of recent archaeological surveys have provided new insights into the importance of Luristān roads in the Sassanid

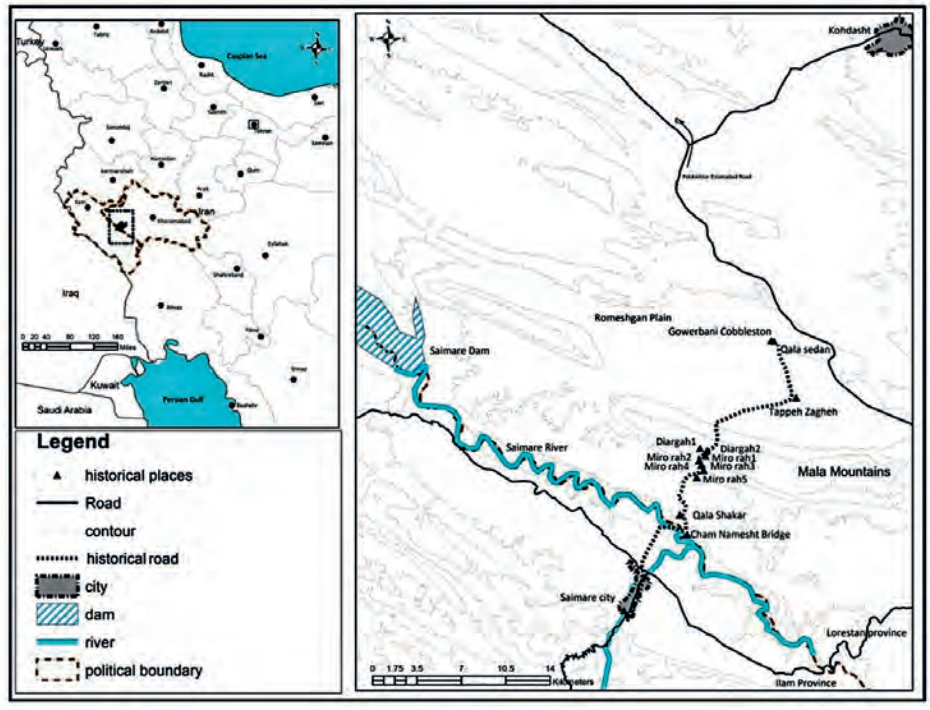

Fig. 1. Map of the western part of Iran, with location of Luristān and Mirorah road (Map by Younos Yousofvand).

period and the early Islamic centuries. In addition to the bridges,[1] the most prominent archaeological and architectural evidence associated with this network of communication, is cobblestone roads, which are partially preserved in several places in the region. One of these previously undocumented cobblestone roads is the cobblestone road known as Mirorah in the mountain Mahleh between the historic city of Saymarra and the Rumishkan valley in the southwest of Luristān province.[2] This road was discovered during an archaeological survey by the authors in 2017. Geographical coordinates of the starting point and the end of the cobblestone road are as follows: starting point: N: 33 13 593 and E: 47 26 052; and ending point:

[1] Such as the Pol-e-Dokhtar and Gawmishan bridges (Stein 1940).

[2] Another example of such a cobblestone road has been identified in north Luristān in the northeast of the modern city of Kohdasht (Izadpanah 1971: 276).

Fig. 2. Mirorah Cobblestone Road
(Photograph by Younos Yousofvand).

N: 33 14 507 and E: 47 26 477 (Fig. 1). This article will introduce this cobblestone road and will discuss its date of construction.

Archaeological Evidence of the Mirorah cobblestone road

Remains of this cobblestone road were discovered at Kuh-i-Mahleh (Mahleh Mountain) between the historical city of Saymarra and the Rumishkan Plain (Fig. 2). This road started from the city of Saymarra, and after crossing the Chamnemesht Bridge[3] over the Saymarra River it goes to the Qaleh-ye Shakar (Fig. 3A, fig. 4A and fig. 5). After 2 km in northern direction the road arrives in Mahleh. The cobblestone road starts from the slopes of the mountain and continues to the top (Fig. 2). Where the road ascends along the steep slope of the mountain, rocks were cut and stones used to create a pathway. In this road, carcass stones of different dimensions were

[3] Earlier reports referred to it as Pol-e-Ao Bordah (Stein 1940: 212-216; Parviz 1381: 137).

used in dry-stone method to create a smooth and passable surface. The space between the stones was filled in the upper parts with soil and sandstone. The dimensions of the used stones are different depending on their location on the road, i.e. in the lower parts, larger stones, and in the middle and upper parts, smaller pieces were used. Where the road passes through rocky terrain, a path was carved out of the rocks and supported on the downhill side by a carefully layered dry masonry of blocks and stones. The width of the cobblestone road is between 200 to 300 centimeters and the length is more than 2 kilometers. In some parts, the height of the supportive masonry is more than two meters.

Along the cobblestone road at different intervals and over the road bends were made some small buildings from stone and plaster. These buildings are very small and have one or two rooms. From the base to the top of the mountain, 6 samples of these buildings were identified (Fig. 3C). At the beginning of the ascend, a cistern was constructed measuring 6 meters by 2.50 m and reaching 3 meters into the ground (Fig. 3B). Its interior is covered with a layer of mortar. The rest of the buildings were small spaces for temporary use by travellers and caravans. The ceramics obtained from these structures shows the characteristics of Sassanid pottery (Fig. 6 and Table 1).

In the highest part of the mountain, at a height of 1600 meters above sea level, in a strategic position overlooking the Mirorah road, the city of Saymarra and the Rumishkan valley, was identified a fairly large archaeological site named Diārgāh.[4] Architectural remains recorded at this site include a structure built of rocky materials, with remains of a plastered and partly tiled wall at its highest point. The structure is preserved only in its lower part and contained some pottery fragments. At the outset of the small valley, where the site was built, a ditch was installed for the storage of superficial waters. Scattered ceramics on the surface of this site have the characteristics of the Sassanid period (Fig. 6 & Table 1). In addition to serving as a resting place for caravans and travellers, the site also had the additional function to secure a safe passage through this mountain stretch. After crossing Diārgāh, the road passes through a steep slope, enters the plain of

[4] Diārgāh is an expression from the Lurish language that is composed of two words: Diār and Gāh. Its first part means "easily visible" and the second part is the suffix indicating a place name. This word meant the high place that has a good view to its surroundings and that could be seen from far.

Rumishkan and after 4 km arrives at Tappe Zagheh. After passing through Tappe Zagheh, the road arrives at Seden Mountain. In Seden, remains of more than 2 km of a cobblestone road have been discovered. This cobblestone road is known as Gowerbani road. On the top of the mountain overlooking the Gowerbani cobblestone road and the Rumishkan Plain sits a small castle called Qale-ye Seden.

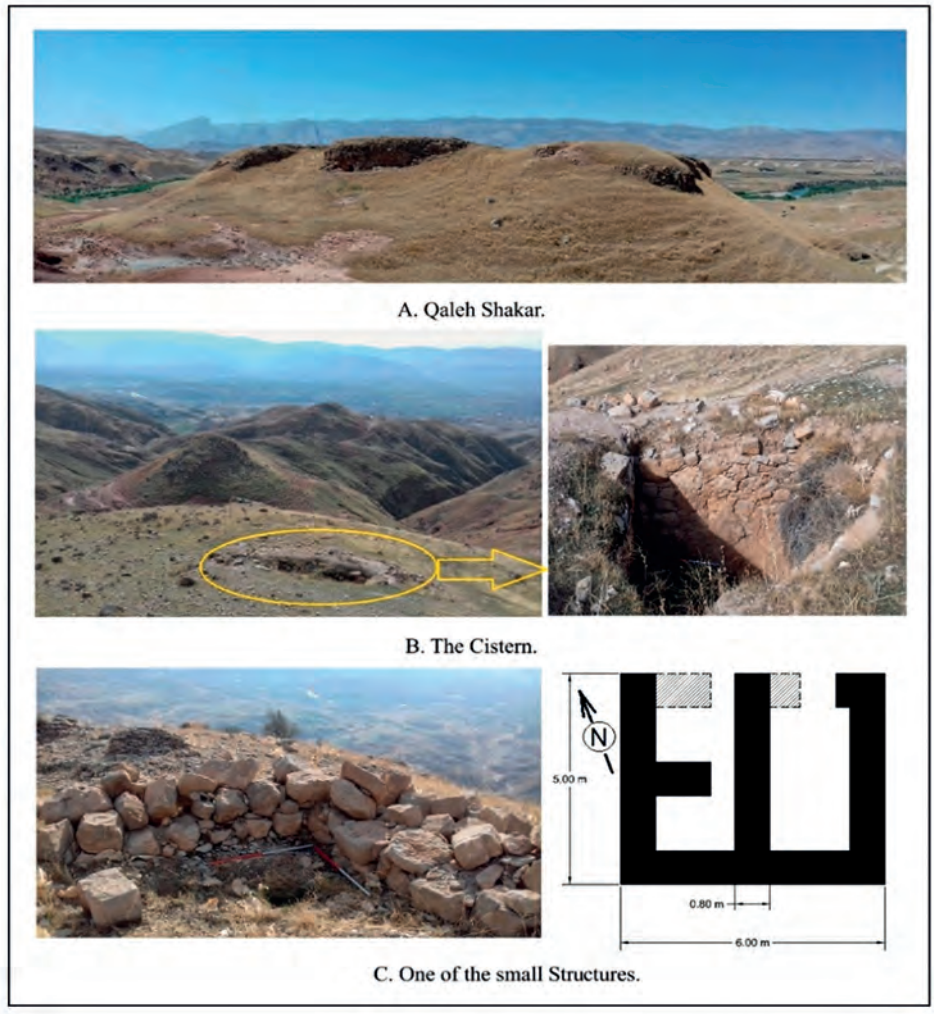

Fig. 3. Monuments along Mirorah road
(Photograph by Younos Yousofvand).

Fig. 4. Aerial images of the Qaleh-ye Shakar and Chamnemesht Bridge (Google earth 2018) (Image by Younos Yousofvand).

Fig. 5. Aerial images of the Qaleh-ye Shakar (Google earth 2018) (Image by Younos Yousofvand).

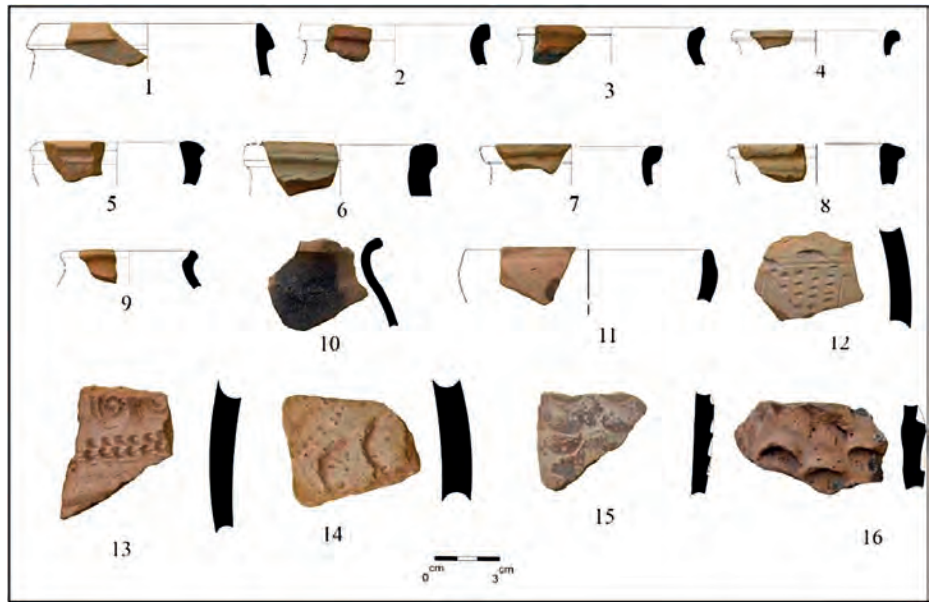

Fig. 6. Collected ceramics from the monuments along Mirorah road (Drawings by Younos Yousofvand).

Table 1. Descriptions of ceramics.

Number	Location	Description
1	Diārgah	Rim of jar, Orange red fabric, Orange slip.
2	Diārgah	Rim of jar, Orange red fabric, Orange slip.
3	Diārgah	Rim of jar, Orange red fabric, Orange slip.
4	Diārgah	Rim of jar, Fine buff reddish fabric, Buff slip.
5	Diārgah	Top of small bowl, Orange red fabric, Orange slip.
6	Diārgah	Rim of jar, Red fabric, Buff slip.
7	Diārgah	Rim of jar, Fine buff fabric, Buff slip.
8	Diārgah	Rim of jar, Orange red fabric, Orange reddish slip.
9	Diārgah	Rim of jar, Orange red fabric, Orange slip.
10	Qaleh-e Shakar	Rim of jar, Fine buff fabric, Buff slip. With effects of burns on the outside.
11	5 Structure	Top of small bowl. Buff fabric. Medium cream slip.
12	Diārgah	Fragment of jar (?). Fine buff fabric. Buff slip. Engraved decoration.
13	3 Structure	Fragment of jar. Orange red fabric. Buff slip. Stamped decoration.
14	3 Structure	Fragment of jar. Orange red fabric. Buff slip. Stamped decoration.
15	Diārgah	Fragment of jar. Fine buff fabric. Buff slip. Stamped decoration.
16	Diārgah	Fragment of jar. Orange red fabric. Buff slip. Stamped decoration.

Historical texts and this road

Abu-Dulaf Mis'ar ibn Muhalhil Khazraji, a traveler and geographer of the tenth century AD, provides us with the oldest reference of this road. He travelled to Saymarra by this road and mentioned the great bridge between Saymarra and Tarhān. "There is a great, beautiful and strange bridge between Saymarra and Tarhān that is twice as big as *Khaneqin* Bridge", he writes (Abu-Dulaf 1955: 14 and 45). Yaqut al-Hamawi also named the bridge between Saymarra and Tarhān and referred to it as "… the wonderful bridge of the world" (Yaqut al-Hamawi 1982: 407). In the documents of the Qajar period, this is referred to as the "Khosrow road"; Cherikoff took the road during the Qajar period and said that people go through the Khosrow road from Saymarra to Bistoon and Taq-e-Bostan (Cherikoff 1977: 99-102). An unknown officer from the central government in the Qajar period said: "When there was a city as Saymarra in the mountains, a spiral path was built to be near to Rāmeshgaran [Rumishkan], including stones and plaster, and cobblestone used in its ups and downs and is now found in some places … and they say that this road was built during Khosrow's era" (Anonymous Geography 2016: 92).

Grafting these reports to the current location of the Mirorah cobblestone road between Saymarra city and Tarhān districts and the existence of the Chamnemesht Bridge between them, it can be said that the Mirorah cobblestone road is the same road that is known as Khosrow road in documents of the Qājar period. It is the road that Abu Dolāf used to go to the city of Saymarra.

Date of construction

In the absence of any written or textual evidence, determining the exact date of construction of the cobblestone road is challenging. In this situation, we must rely on the architectural and archaeological evidence of the monuments alongside it. The date of settlements of the surrounding areas (South and North) of this cobblestone road that was built to connect these areas, is also helpful evidence to discuss the date of the cobblestone road itself. Since this route connects the Saymarra valley to the south of Mahleh Mountain to the Rumishkan Plain in the north, this section refers to the settlements of these two areas.

Saymarra valley sites in the south

According to archaeological findings, this region flourished in the late Sassanid and early Islamic centuries[5] (Mazaheri 2006; Shahbazi 2006). Historical sources also confirm this to some extent. The most important monumental projects in the southern region of the road include Qaleh-ye Hezar Dar, a large Sassanid castle (de Morgan 1896: 368. Pl. LXII), the historical City of Saymarra (the most important city in the region), Chartaqi-e-Chamnamest (Allibigi 1393) and Chamnemesht Bridge (Stein 1940: 212-216). The most important of these sites is the historical city of Saymarra, the ruins of which are located in the northern part of the small town of Dare-e Shahr in the Kabirkuh valley (Fig. 7 and 8). The foundation of this city dates back to the Sassanid era.[6] The city has also flourished in the early Islamic centuries, especially during the rule of the Hassanwayhids.[7] Saymarra was the most important city on the communication road of Khuzestan (Susiana) to western Iran. Hassanwayhid rulers have done a lot to boost the city: the development of communication roads leading to the city and the restoration of bridges along them were the most important of these operations. An example of these actions can be seen in the Gavmishan Bridge 30 km east of the city of Saymarra (Stein 1940: 191-192; Izadpanah 1971: 488; Parviz 1381: 137). This bridge connected Saymarra to Shapurkhast. There was an inscription on this bridge in which the date of construction of the bridge is mentioned: 4th century AH (Izadpanah 1971: 488).

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[5] More than 80% of the sites identified in area behind of Saymarra Dam are related to the late Sassanid and the early Islamic period which clearly indicates the region's prosperity during these periods.

[6] Although Lakpour has mentioned a date of construction of the city in the second century AH (Lakpour 2010: 125), more recent excavations have yielded evidence of the Sassanid period (Faryadian 2009: 318). More recent research has also emphasized the existence of the city in the Sassanid period (Whitcomb 2018: 77-99).

[7] The Hasanwayhids (330-405/941-1015) was a local government in western Iran contemporary with the Boyed dynasty. The Hasanwayhids ruled over a vast area in western Iran including Luristān, Kermanshah, Elam, Hamadan and the northern parts of Khuzestan province. The land under the Hasanwayhids rule was a buffer region between the Abbasids and the Boyed's (Ozkaei 1988: 119-157).

Fig. 7. Saymarra valley. View from south.

Fig. 8. Saymarra city. View from the north.

Sites in Rumishkan Plain in the north

Many sites have been discovered during previous archaeological activities in the Rumishkan Plain (Fig. 11). The most important of these sites such as Teppe Zageh,[8] Chartaqi-e Kahzad (Motamedi 1994: 17), Qaleh-ye Seden and Chiabor are related to the Sassanid era to early Islamic centuries

[8] Jacques de Morgan, was the first scholar who commented on the Teppe Zageh building (de Morgan 1896: 214-215). Schmidt, during his archaeological surveys in the Rumishkan Plain, took the first photos from the Teppe Zageh building and introduced it as the ruins of a building from the Sassanid period (Schmidt, van Loon & Curvers 1989: 9, Pl. 4c). Stein introduced the building as "a small but important settlement in the Rumishkhan Plain (Stein 1940: 220). Recent studies on this building showed that it was a caravanserai from the Sassanid period that was also used during the early Islamic centuries (Yousofvand 2019: 76).

Fig. 9. Caravanserai of Zagheh. View from north.

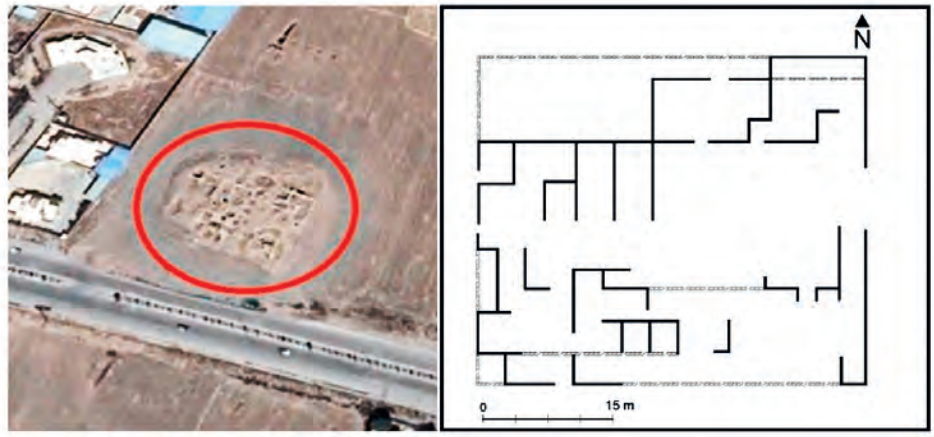

Fig. 10. Aerial photograph and plan of Caravanserai of Zagheh.

(Jahansoz 1350). The monument known as Tappeh Zagheh[9] is the most important of them that is located in the centre of the Rumishkan Plain (Fig. 9 and 10). Recent studies on this building showed that it was a caravanserai from the Sassanid period has been used until the early Islamic centuries (Yousofvand 2019: 76). In the Rumishkan Plain, the road

[9] In Lorish language Zaghe means the stone buildings with barrel vaults half of which is underground, while the rest of it is above surface.

continued to the Zagheh Caravanserai and passed along the Gowerbani cobblestone road (Fig. 12) and Qaleh-e Seden (Fig. 13). Qaleh-e Seden is located overlooking the Gowerbani cobblestone road and the Zagheh caravanserai in order to protect this road as well as the caravans (Yousofvand 2019: 84). The archaeological evidence of the Tappe Zagheh and Qaleh-e Seden indicate that these monuments were constructed in Sassanid period, but remained in use during the early Islamic centuries.

Surveying the landscape of the area indicates that the Mirorah cobblestone road has been a part of the larger road construction project that started from the city of Saymarra and continued to Qaleh Seden in the north of Rumishkan (Fig. 13). Accomplishing such operations in the mountainous regions such as Lorestan reign have been difficult and costly in all periods. It would have required significant resources in terms of workforce, materials, and time. Undoubtedly, the construction of such projects, in addition to financial resources, requires the support of rulers and governments. On the other hand, the construction of such roads was carried out when there were significant areas on both sides of them, and establishing comfortable and secure communication was necessary for the government. The archaeological and historical reports demonstrate that the late Sassanid period and the early Islamic centuries have been a highly prosperous period in the history of the area. In these periods, conditions have been

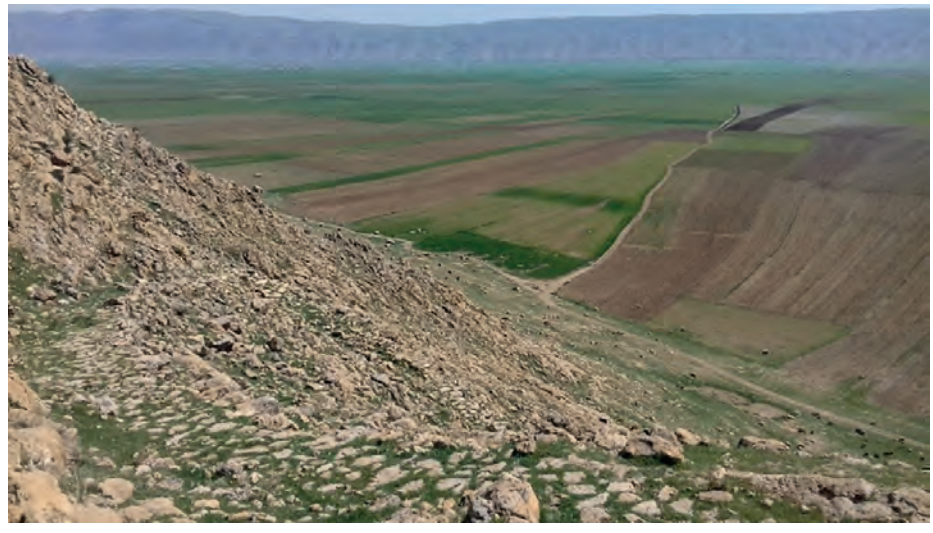

Fig. 11. Remains of Gowerbani Cobblestone.

provided to accomplish such large projects. The architectural evidence and ceramics scattered on the surface of small structures along the Mirorah demonstrate that this cobblestone road was available in the Sassanid era and the Early Islamic centuries. The archaeological evidence obtained from sites and the settlements located to the north and south of this road

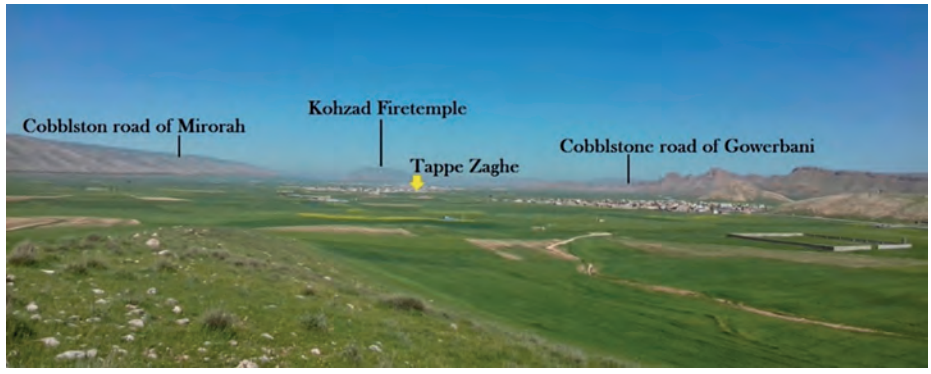

Fig. 12. Location of sites in Romishkan plain.

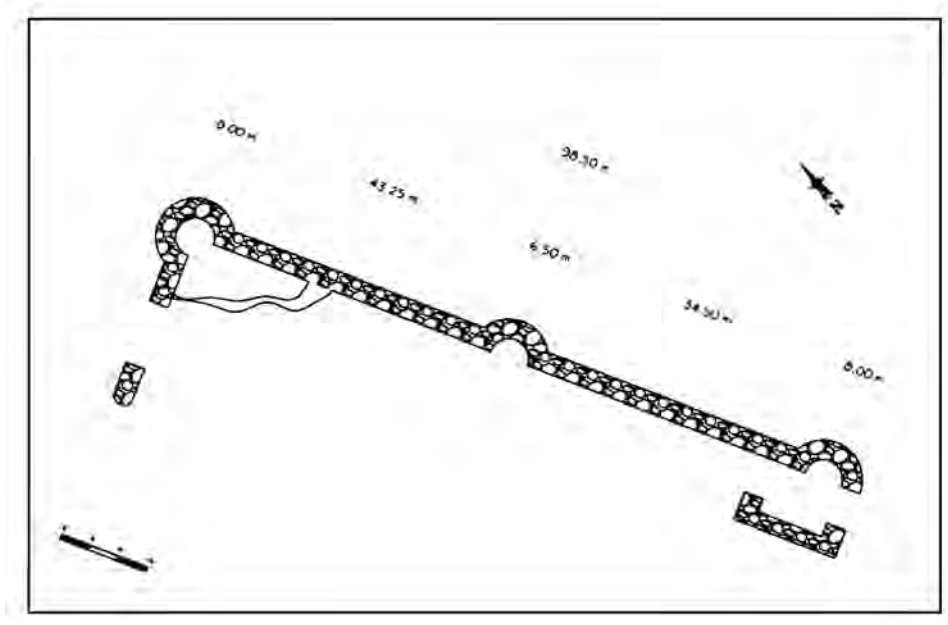

Fig. 13. Plan of Qaleh Seden in the north of the Rumishkan Plain.

confirms this. In fact, important Sassanid sites have been discovered, some of which (such as Saymarra near which large bridges have been built) are important cities that need a road as a communication infrastructure. Therefore, the date of construction of the cobblestone road is Simultaneous with the date of cities and sites around it. This route also have been used in later periods, especially in the early Islamic centuries.

Conclusion

This article documented the part of the communication road joining Khuzestan province to western Iran. In addition to its archaeological value, this road is a unique example of the road construction technique, because most of its parts were built without the use of mortar. The archaeological record of Saymarra valley (in the south) and Rumishkan Plain (in the north of it) indicates that the construction of such cobblestone road in this area was possible only from the late Sassanid period to the early Islamic centuries. The architectural evidence and ceramics scattered on the surface of small structures along the cobblestone road support the date of construction during the Sassanid era and the early Islamic centuries. The settlements located on the north and south side of this road are also related to the Sassanid era and the early Islamic centuries. The date of the construction of the cobblestone road coincides with the date of the surrounding cities and sites. Historical texts related to the early Islamic centuries also indicate the existence of a communication route between the city of Saymarra and the district of Tarhan. This evidence shows that this cobblestone road was constructed during the Sassanid era and was also used in the early Islamic centuries. The survey team aims to continue research in southern Luristan and northern Khuzestan to identify further archaeological evidence of this road. With more archaeological evidence we can talk about the economic, military, cultural, and political functions of this road.

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BULL SACRIFICE AT ESFANJĀN, A CASE OF RITUAL SYNCRETISM

BY

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Abstract: Annual sacrifice of bull is a local ritual performed in one of the villages near Tabriz, known as Esfanjān. The ritual contains some features in terms of its date of exercise, its eminent emphasis on the bull, and the narrative which surrounds it, that absolutely take it apart from the current religious context of the village's inhabitants, Islam. The present paper concerns with resolving this dilemma by looking for its possible pre-Islamic roots, through an in-depth examination of sacrifice within Avestan traditions. Through a consideration of sacrifice and its status within pre-Islamic religious traditions of Iran, and comparing their basic features with findings of ethnographical observations, it is shown that there is a tight match between the observed cult and pre-Islamic doctrines on animal sacrifice. As a relevant theoretical framework, syncretism is adapted here to discuss the hybrid nature of the Esfanjān event, which is composed of both Islamic and non-Islamic features. Although the exact origin of the Esfanjān bull sacrifice remains unknown, something is clear: it is not a passive remnant of something lost forever, but an active product of a creative process, through which some new and hybrid creature comes out of a successful interbreeding of two different belief systems.

Keywords: Zoroastrianism; Islam; Bull sacrificing; Syncretism; Fertility; Esfanjān

Introduction

One of the local rituals are still practiced in rural areas of Iran is called *Öküz Ghorbāni* that takes place in Esfanjān village of East Azerbaijan, Iran. Occurring on the first Thursday after 36 days of spring pass, this ritual consists of sacrificing a bull and the beliefs surrounding it. Although it happens within a local and Islamic context, we cannot consider it as an

Islamic ritual usage. There seem to be elements that depend on other beliefs and cultural bodies, and that are more likely to have originated from local practices. The paper's focus is on detecting the historical origins of Esfanjān's bull sacrificing ritual through careful examination of its constituting elements. The hypothesis is that ancient roots of Esfanjān's bull sacrificing should be looked for among some features other than Islamic ones. Considering the similarities between this local ritual and Avestan sacrifice-related beliefs, some synchronized origin is supposed for it in this paper.

The hypothesis would be examined in term of syncretism. According to syncretism, various features of different cultural and religious entities could be collided if they meet each other at some marginal point, resulting in the dominance of the superior entity's features over the weaker one on the one hand, and infiltration of modified forms of the weaker one's features within the superior one on the other hand. In other words, although one universal religion could be more powerful and dominant over the people who also have had their own local beliefs and rituals, certain parts of their local traditional experiences still would have a chance to survive and to flourish in one way or another within the context of that dominant universal religion. Of course, this survival is not passive, but an active creation of a new hybrid belief structure out of two different systems' syncretism.

The research is based on ethnographic observations and interviewing locals on the local cult of the Esfanjān bull sacrifice. In addition to a detailed description of the ritual, a folkloric account regarding its origins has been recorded through an interview with the village elderly. In addition, Avestan texts has been reviewed to find out key elements of sacrifice-related beliefs and practices during pre-Islamic times. After finding these elements, their equivalent stages in Esfanjān's cult has also been extracted by analogy. In the extraction of these equivalents, we did our best to avoid any kind of hypertextual or speculative conclusion. Also, despite the lack of historical documents and archaeological evidence, we tried to assess the possibility of a collision between ancient bull sacrifice beliefs and practices with Islam in the historical context of the study area.

Ultimately, the results of this research indicate that collision and syncretism played a vital role in the continuation and alteration of this ritual, which seems to have pre-Islamic origins. Besides, this case study showed that syncretism could play a significant and active role, along with other

local and cultural aspects, in the structuring and alteration of forms, something which needs to be more emphasized and highlighted in regional and local researches.

Ethnographic Observations and Setting

Esfanjān village is a suburb of Osku in East Azerbaijan, located in the western foothill of Mount Sahand on the way to Kandovan. So far, no research has been done to estimate this village's age, and there is only one bathroom expected to be of the Qajar period. On the northern parts of the village, there is a cemetery with 'ram stone sculptures' as its prominent characteristics. Some inscriptions on these sculptures show the date of seventh century AD. The ram (Ovis Aries Orientalis) is believed to be a manifestation of Avestan Geush (the Universe), who is the saviour of all the beasts (Bartholomae 1904: 505). The region is mainly populated by Turkish speaking communities who call the creature Quch, which is very close to Avestan Geush phonetically. The very appearance of this kind of burial marks in Esfanjān cemetery, although are belonging to the medieval Islamic period, would be an evidence of continuity of some pre-Islamic religious features within an Islamic context.

One such local and probably ancient ritual observable in Esfanjān is the ritual of the 'bull sacrifice', which takes place every year on the first Thursday after 36 days of spring pass (*Ordibehesht*, the month, the constellation of which is Taurus, a male cow). The cost of the bull and the ritual is paid by the villagers through charity donation.

On the morning of the ceremony, the bull is circled around the village by males in order to keep evil away (Pl. 1). Women are only allowed to participate in this introductory part and leave their houses to watch the bull. They also come with bowls full of almonds, bread, cheese, and dates and hang their vows around the cow's neck. Öküz and men walk together to the holy and bountiful stream called 'Eydāvā'.

The bull drinks a lot of water at 'Eydāvā' which is the most extended stream in the village and which acts as a consecrated place. The locals also consider this act to help the fertility of their farms and also drink from the water.

The next destination is the 'Pirsangi shrine' located on top of a hill next to the village and consisting of one room of 3 in 5 meters. The existence of a vast rock has made this a sacred spot. The locals call it the 'Black

Rock' (Pl. 2). The village's ancient cemetery locates alongside this holy rock.

Inside the black rock, there are two holes going through its diameter. Children throw stones through this opening, which is 25 centimeters wide and 15 centimeters long and looks like a cave entrance, and if the rocks fall off from the other side, their wishes will come true. The locals have a story about this; it is said that one day Imam Ali (the first of Shi'ite Islamic saints) was passing by this village and decided to make a hole inside the black rock, thus the existence of a hole in the stone is believed to be a result of his sword hitting the rock!

On this holy hill, people serve sweets as a kind of celebration. The bull is led around the rock and the shrine to make it blessed. Women are not present at this celebration. After doing the Pirsang ceremony, the locals and the bull move toward 'Ghorbān Dāghi' (Mount Ghorbān, meaning mount of sacrifice). Some locals do not take part in the Pirsang ceremony and go directly to the mountain and wait for the bull's arrival.

Before the bull's arrival, some men create a narrow path from the sacrificing spot to the porcelain stone, known as 'Neshān-Gāh' (the target) to make the bull blood flow in it (Pl. 3 & 4). The path is about 30 feet long and is also protected with metal fences around it to keep the blood clean. The locals believe that if the bull's blood travels through the path and reaches the 'target', their wishes will come true.

After sacrificing the bull, the time comes to share its blessed meat among people. This ritual ends with a dinner feast. At this part, 'Kufteh' (a local food composed of meat, rice, and cereals) is served as the only meal.

The Story behind the Cult

The locals of Esfanjān have a story explaining the origins of this ritual. The story goes that a girl or a group of girls got lost on a mountain, transforming into some well or low-flow stream.

The tale has it that, after Muslim armies landed in the area, some injured Muslims hid in a valley between Mount Pirsang and Ghorbāngāh (the place of sacrifice). The elders of Gabrs – non-Muslim Iranians – got informed and ordered everyone not to feed them so that they would die. A shepherd Gabr girl fed the troops secretly to heal. After a while, her brothers found out about it and decided to kill their sister. The brothers set

out for the mountain intending to kill their sister. The girl found out and fled to the mountain. The brothers got very close to her on top of Mount Pirsang. The girl ran downhill and passed through Ghorbāngāh. On top of the Mount Ghorbāngāh, she could hear her brothers panting for breath, but she was so tired of escaping. The sun was about to set. The girl stood there, to hide from their eyes. Her prayer came true, the earth opened so she could hide there, except for some locks of her hair. The brothers could not find her. Night fell, and they decided to return later with the appropriate equipment. Marking the spot of her disappearance, 'they put a rock on the hair locks outside the soil' and left.

The next morning, they went up the mountain to take her out. At the top of the hill, they saw hundreds of rocks and disappointed, they returned to the village. So far, we are confronted with a nourishing girl buried in the mountain. As a result of her disappearance, some storm raised, destroying all fertility and prosperity. It was so wild that it plucked out the trees and took away the sheep and killed them. Everyone was helpless until an old woman dreamed of the girl. The girl informed the old woman of her burial place, mentioning that the locals must sacrifice a cow and shed its blood on her protruded hair. Here's where bull's blood is necessary to recover the lost fertility and life, an annual custom that has continued to this day.

Zoroastrianism on the First Cow

The corpus of Persian oldest sacred Avesta texts contains different parts composed at different times, with the earliest parts known as Old Avesta. This part has been linguistically attributed to the second millennium BC, constituting Gathas -the earliest hymns written in Avestan language, which are rhythmically comparable to Atharva Veda (de Harlez 1885: 340-341). Yet, it seems that the other parts, the younger ones, were composed by different persons in different locations during the first millennium BC, mainly in the Pahlavi language. The Avestan complex as it has come to us could be divided further into Long (Yasna, Yasna ī Rapiθwin, Vīsprad, Vīdēvdād, Vīštāsp Yašt) and short (Khorde Avesta, Avesta Yašt) liturgies (Andrés-Toledo 2015: 519-521). Sacrificing as a ritual practice does not appear in the Gathas.[1] Most of the Gathas' quintuple Hymns are dedicated

[1] Of course, in the Old Avesta (Gathas), Zarathustra has forbidden the karapans from blood sacrifice:

to the praise and adoration of Ahura Mazdā and divine spirits. On one occasion, however, there is some allusion (*Y*. 29) about Geush-Urvan as 'soul of the First Cow' (Boyce 1975: 138-140; Malandra 2001a & 2001b). There, the soul is weeping and grieving, asking for to be relinquished from rage and depredation.

The first Cow, according to the Bundahišn, is the first animal created by Ahura Mazdā at the shore of the Daitiia River located in Aryana Vaējah, land in the middle of the world (Sangari & Moghaddas 2019: 3). In the most original Avestan text, the cow was killed by Ahriman, and as a result, other animals were created from its seed. It seems that the Gathas' Geush-Urvan, groaning of Ahriman's tyranny and injustice, is the representative of all of the animals. We know this at least on the basis of two Yašts of the younger Avesta, namely Māh Yašt and Rašn Yašt, according to which, after the cow's killing by Ahriman, its seed goes to the moon to be the source of all beasts of the world. So, it is clear that the First Cow was not sacrificed for the sake of praying, but was the victim of Ahriman's malignancy and its anti-creation acts; at least initially (see below).

There is no sign of ritual and liturgical sacrifice throughout the next part of Avesta, Yasna, believed to be relatively close to the Gathas chronologically (Doustkhah 1994; Geldner 1889-1896). Nevertheless, there is some allusion from Yasna (*Y*. 38) informing that Ahura Mazdā bestowed a sheep's organs to Haoma. Interestingly, the act of sacrifice, mentioned for example in the Tištar Yašt, is not an act of liturgy, but a kind of divine support conducted by Ahura Mazdā itself; and it is not clear from the text which kind of animal was sacrificed by the god (Panaino 1986: 272-273). Precisely towards the end of the same Yašt we find Ahura Mazdā ordering followers to sacrifice one-coloured sheep to Tištar for the sake of well-being and to be safe from evil. This order recurred in the other Yašt, namely Bahrām Yašt. Overall, Avestan sacrifices are not far-reaching and

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'ahiiā. gərəhmō. ā.hōiϑōi. nī. kāuuaiiascīṯ. xratūš. nī. dadaṯ.
varəcå. hīcā. fraidiuuā. hiiaṯ. vīsəṇtā. drəguuaṇtəm. auuō.
hiiaṯcā. gāuš. jaidiiāi. mraoī. yə. dūraošəm. saocaiiaṯ. auuō.' (*Y*. 32.14)

Translation: 'The Kavis, being a Grehma gang, lay their intellects and their dignities into its fetter day by day. They take their positions (at the sacrifice) in order to assist the deceitful one and, (by obeying) the command "let the (sacrificial) animal be killed," to assist the one who inflames the fire-proof (haoma twigs).' (Humbach & Ichaporia 1994: 43; cf. Gippert 1998: 179).

even exclusive to one kind of animal. Two other Yašts, namely Ābān and Geush, describe sacrificing acts by mythical kings in some unified pattern, including 100 horses, 1,000 cows, 10,000 sheep, acted mainly on the shore of rivers and lakes on or the mountainsides. All of these animals are defined as 'three clean creatures' in Yasna (*Y*. 11) and none of these sacrifices were dedicated to Ahura Mazdā of course. Rather the beneficiaries of sacrifices were Anāhitā (see Ābān Yašt) or Drvâçpa (see Geush Yašt).

The cow itself is not primarily the subject of sacrifice in the Avestan tradition. Mihr Yašt (tenth Yašt dedicated to Mihr or Mithra, the cow killer of the western religion of Mithraism; Gordon 2015: 454-455) is free of sacrificing acts of any kind. In Mihr Yašt, the function of Mihr is 'to this dwelling he gives a multitude of men and cow' (*Y*. 10.28). He is also the patron of the 'free cow of pasture', as is apparent from one of the Yašt's allusions: 'The (cow) led astray calls him ever with uplifted hands, for aid, thinking of the stall' (*Y*. 10.86). It is in complete harmony with the earlier allusions of Yasna (*Y*. 38), in which we are informed of the 'breastfeeding cow' as 'nurse of the poor'. It is one of the most critical differences between the Avestan Mihr as a herd-giver and the Romanized martial Mithras as a cow killer (see Cumont 1903: 2-32).

Nevertheless, despite this overwhelming belief that there is no substantial connection between the Roman cult of Mithras and the Iranian cults of Avestan Mihr (Gordon 2015: 453), their having the same origin reveals itself in a more profound level; namely, the role of the primordial cow in the creation of the creatures of the world. Creation, according to the oldest Iranian traditions, has had a two-stage process (Kreyenbroek 2015: 500). First, there was a stage of the existence of a single prototype of the creatures without movement. This primordial stage dissipated suddenly by the dramatic killing of an animal (a cow) in the hands of a supernatural being, which brought by it the second stage, characterized by variety and dynamism. This form of killing an animal, which is originally the work of the devil, and yet followed by the creation of other things, is apparent in the Roman Mithraic creation of the world. According to Kreyenbroek (2015: 504) 'while the fact that Roman Mithraism was a largely Roman phenomenon, there are good grounds for the assumption that some elements of that faith may have been inspired by a western Iranian, but non-Zoroastrian religious tradition', rooted in more profound narratives of creation of more primitive origins.

On the other hand, as we have seen, the cow is among the sacrificed animals of the Avestan Yašts, and there is at least one textual evidence of an Achaemenid Era inscription discovered in Cappadocia, which bilingually describes a Mage killing a cow by a bat, dedicating its sacrifice to Mithra (Gordon 2015: 451-452). This God, since at least the Achaemenid period, has been powerfully present in the culture of residents of Iran's plateau and, according to Pourshariati (2008: 358), the appearing of 'Mithraic theophoric names in Aramaic inscriptions of Persepolis' prove that the god has had a significant position among the believers. According to her, Mihr Yašt, which is entirely dedicated to this god, is 'one of the oldest sections of Avesta, some of its sections being even older than Gathas' (Pourshariati 2008: 350; cf. Gnoli 1989: 63; Yarshater 1983: 365). There is not much evidence of this in archaeological accounts of Mihr worshiping in Iran. By analysing, in an article, the motif of a hawk attacking a bull among plaster models in the Parthian-Sassanid Qale Zahak located in north-western Iran, Shahram Zare (2008) has speculated on this motif's relation to Mithraic beliefs, tracking its continuity forward to the fourth century AD. Historically speaking, Pourshariati (2008: 369-386) provides a lot of evidence to show that not only during the Parthian era, but also throughout the Sassanid Empire, Mihr worshiping was a dominant religion among Parthian dynasties occupied in the North and East of Iran (Khorasan and Azerbaijan), especially Karins and Mihranids.

Thus, it seems that Esfanjān's ritual is rooted in some pre-Islamic cults. Yet, the killing of the cow is very rare in Avestan texts. Sacrificing as a whole is conducted basically by the hands of Ahura Mazdā itself or its human representatives as kings and founders. Even in this case, the subject of sacrifice is a male sheep (Geush, maybe Turkish Quch) instead of a cow. Nevertheless, the central position of the cow in Avestan cosmology is evident; something which could be seen clearly in the Esfanjān ceremony. Esfanjān's cow, just like Avestan First Cow, sacrificed itself annually in order to yield prosperity, fertility, and fecundity for land and woman. To better understanding the Esfanjān ritual event and its current position as well as its historical origins, a theoretical framework is needed, capable of explaining continuation, composition, and creative mutation of different cultural elements which originally belong to different cultural systems. What is evident at first glance from the review of the Esfanjān event is a kind of creative evolution of a particular cultural form through the collision of two different cultural systems at their marginal frontiers.

Colliding Cultural Systems and the Rise of Syncretism

If we consider Hunting-Gathering as the most basic cultural system of human beings, every higher system must be based on this. However, the evolution of every system takes place in the marginal sphere of an existing system. This kind of evolution could not erase the basic elements of previous systems, but modify them creatively to become fully compatible with that higher one (Pl. 5). Avestan doctrines and their great emphasis on domestic beasts are part of some higher pastoral cultural system added to the previous ones to provide a new milieu for people's livelihood. In this regard, hunting of the beasts transformed to their pastoring, with sacrificing some samples of them for the sake of some new divine character's satisfaction. Esfanjān, as a village located on the margin of one of Tabriz' suburbs, was influenced much lesser from the invasion of the Islamic cultural system than, say for example, Tabriz itself (as one of the most important financial cities on the way to the Silk road), which was absorbed by trade-related doctrines of Islam much more complete than its satellite agro-pastoral settlements. It means that the introduction of Islam as a new faith into the marginal community of Esfanjān was unable to efface inhabitant's prevailing belief. Rather, it became absorbed into it in some creative manner. The exact cult of cow sacrifice which is currently performed in the village is not Islamic in its core, but could not be called pre-Islamic either based on the narrative which comes with it.

There we meet the interfere of two different belief system 'species', each of them belonging to a separate clade (Avestan to agricultural clade and Islamic to a trade-urban clade). This kind of interfering occurred in a population at the margin of cultural areas of both of them, opening some sort of creative space for speciation of a hybrid one, which itself could play just a marginal part permanently and be a local cultural system/species forever.

What was the critical facilitating link in this creative process of religious synchronisation? The connecting link was a 'meme'; a particular kind of meme, concentrating on sacrifice and its relation to fertility: that is, to gain prosperity from heaven, sacrifice a cow (or some other domestic beast) to it.

One of the common debates in religious ethnography is 'syncretism'. According to Stewart & Shaw (1994: 4), the concept is used to denote religious impurities. They also believe that Erasmus, one of the leading

linguists of the Renaissance, gradually paved the way for the emergence of syncretism in the western thought by provoking the idea that Christian theology brought together the influences of the classic world and increased the power of Christianity. The main concept of syncretism is that the collision of religious customs causes the universal religious tradition to become dominant over the weaker local customs but, at the same time, adopt and acknowledge an altered form of certain local customs. They (1994: 5) even go so far to claim that all religions are of mixed origins and are constantly being reconstructed through processes of syncretism and removal.

The concept of syncretism was introduced by Melville Jean Herskovits (Droogers & Greenfield 2001: 26) into ethnographic researches. His work was concerned with acculturation and the collision of different cultures as integrated parts of ethnography during the 1920s and 30s (Ibid.). What syncretism does in ethnography is illustrating a picture of what happens when a more powerful culture collides with a people's local culture. From within this continuity, mixed forms of cultural elements emerge which, even though a more dominant culture is in control, they pave the way for the hidden continuation of local culture and sometimes also guide it toward meaningful/effective directions.

By concentrating on how Islam reached North Africa and was accepted by the natives, the archaeologist Tim Insoll (2004: 137) insists that in these areas, 'where conversion did take place, syncretism of Islamic and traditional religions frequently occurred'. For him, the most critical areas that can become syncretized through cultural collision are synchronic structures and its implications for the earth and fertility. Insoll has even gone further and suggested that the process of 'conversion' is really important in syncretism (Insoll 2004: 138), referring to Islam and the Hindu as examples.

What is presented in this paper can be an example of syncretism. Here, we are facing with a ritual which is obviously not 'Islamic' by heart, but is actualized by a rural Muslim community, even coloured by some elements from narratives concerning the introduction of Islam into different regions of the Iranian Plateau. Is this not an example of syncretism, where ancient (and possibly local) rituals become mixed with Islamic customs? At first glance, there are many similarities between it and Avestan rituals, beliefs and doctrines.

Iranian Basis of an Islamized Cult

The overall picture of the Esfanjān ritual is that a cow must be sacrificed in order for a trapped girl to be freed. The ceremony is held every year on the 36th day of spring, coinciding with the last day of the first Zoroastrian '*Gāhānbār*/*Gahambar*'. The five-day-long *Gāhānbār*/*Gahambar* is called '*Maidh-yo-Zarem-Gāh*' or 'middle-spring' memorizing the creation of Heavens or *'mēnōg'*. The month of the Esfanjān's ceremony belongs to Taurus (Bull), according to traditional Indo-European calendars.

Cow has a central position precisely from the first parts of *Gathas*. Right on the first paragraph of *Gathas*, we are told of *Geush-Urvan*'s satisfaction; it is the soul of 'First Cow' in Pahlavi texts, whose personification is the nourishment of peoples of the world. The cow is the primordial source of creation in Avestan cosmology and its seed has been the origin of all other creatures. The sacrifice of First Cow, whether by some divine or devil power, in the final analysis, has to be seen as the primordial event of creation. The shedding of cow's blood on earth is to be considered in this regard as the fundamental agent of the world's prosperity. It was the cow whose blood sanitized all drought and famine from the face of the earth.

All aspects of Esfanjān's bull sacrificing ritual, from its calendar-temporal origins to its bull-related practices, gender preferences, places of sacrificing, and the customs after that, even the folkloristic story of its origins, have decisive equivalents in Avestan cosmology.

Avestan beliefs, those related to *Mihr* in particular, have had considerable historical roots in regions of Northwestern Iran, Caucasia, and Eastern Anatolia. During the Sassanid period, Northwestern Iran was controlled by dynasties that had Mithraic beliefs, and worshipping *Mithra* was widespread among them. However, there is not much archaeological evidence or valid research done to prove this except for a few ram motifs and statues (which, according to *Mihr Yašt*, could be one of Mithra's representations). Then again, this small amount of archeological and historical evidence indicate that worshipping *Mithra* was not only known in this area, but also, that they are still present and are part of people's beliefs and customs; the bull sacrificing ritual can also be considered on the same basis. In this case, the appearance of the ram statutes on some of Esfanjān cemetery graves, dated to the medieval Islamic period, not only does not have any

equivalent in Islamic Doctrine, but bears some sign of a kind of creative continuation of Avestan traditions within the new context of Islamic ones, in itself.

Conclusion

Esfanjān appears to be one of the creative zones of cultural synchronism; a local marginal site for speciation of some new cultural forms out of the evolutionary process occurring as a result of colliding two different cultural systems at their frontiers. For instance, sacrificing in Islam has a special place of its own. It does not only happen at certain times of the year regularly (e.g. *Eid-e Ghorbān*), but also has fundamentally rooted in Abraham's monotheistic sacrificing. Syncretism can clarify those rituals which, although still exist within the more dominant culture, are not deeply connected with it. Syncretism reveals that although the bull sacrificing ritual is practiced in a Muslim community, it does not necessarily have Islamic origins and is probably a remnant of some more local and possibly pre-Islamic ritual. Therefore, we should look for its origins in some ideology other than Islam and yet local.

Elements such as the hole created by Imam Ali's sword, or feeding 'injured Muslim fighters' by a daughter and having nowhere to run, although this is not a major part of the story and does not change the general meaning of the story, show that, when two religions came into contact with each other, elements from the more dominant one penetrate the less dominant one and make the continuation of that local belief possible. These 'inconsistent' elements are additions which, according to the principles of collision, syncretism, and transformation, have paved the way for the existence of an altered form of this ritual within the context of modern culture.

In this study, syncretism was taken into consideration as one of the fundamental attributes of local/native cultures and belief systems colliding with more dominant and powerful religions, exemplified here by analysing Esfanjān's bull sacrificing ritual. It seems that popular cultures are full of syncretic and altered elements, and over time, this has caused their true origins to become hidden among the other beliefs and systems that formed due to syncretism. Academic focus and serious research need to be done on syncretic aspects of popular beliefs and rituals to pinpoint their originality clearly. An instance of such research presented in this study.

The result can open our eyes to the fact that the cultural entities we are looking at, especially in the contemporary local/indigenous contexts, are neither passive remnants of extinct cultures nor pure elements of a living culture within which they have presence. Rather, they are creative products that are formed of some key elements of two or more cultural systems.

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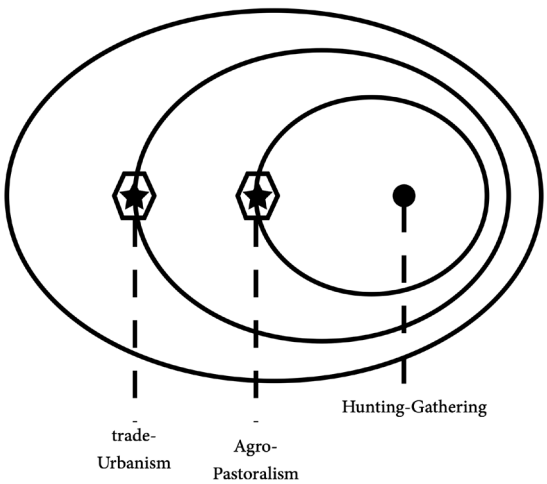
Pl. 1. Sacrificing Bull of Esfanjān (photo by authors).

Pl. 2. Sacred or Dark Rock (photo by authors).

Pl. 3. Blood of sacrificed bull flowing to the main water source of the village (photo by authors).

Pl. 4. Blood of sacrificed bull flowing to the main water source of the village (photo by authors).



Pl. 5. Collision of Cultural Systems (by authors).